

# The Chemical Age

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**NOTICES.**—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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## The Avoidance of Atmospheric Pollution

No one can peruse the Chief Alkali Inspector's Report for 1924 without being impressed with the quiet yet effective way in which this department of the Ministry of Health conducts its work, and administers the Act which constitutes the basis of its surveillance. In whatever direction of the heavy chemical industry one looks, it will be found that there is a steady and progressive improvement towards the avoidance of atmospheric pollution, largely due to the suggestions and kindly advice forthcoming from the inspectors. In alkali and copper (wet process) works, mechanical saltcake furnaces have been introduced, and at a number of works where hand furnaces are still employed, satisfactory cooling boxes have been built, which allay the fume, particularly noticeable in a damp atmosphere, that has hitherto occasioned considerable anxiety to the inspectors. At cement works where the dry process is in operation, the nuisance accompanying the discharge of dust into the air has been the subject of complaint for some time. This nuisance has been mitigated by the installation of bag filters, which have served a double purpose. Not only has the dust been largely arrested, but much material previously lost has been returned to the process.

Smelting works which exist in the south-west of England apparently have not yet reached an ideal

state from the point of view of the Act. Where the smelting of lead ores and the calcination of tin concentrates are undertaken, the evolution of sulphurous acid can be dealt with in small towers containing limestone, and these serve to arrest the bulk of the noxious gases. But there are cases where it is necessary to introduce a shower of milk of lime in order to cope satisfactorily with the noxious escape. Reading between the lines of the Report, it would appear that works which carry out the calcination of zinc blende are a source of some anxiety to those responsible for the administration of the Alkali, etc., Works Regulation Act. Sulphur dioxide is emitted from such works in various degrees of concentration according to the type of calciners used. With open furnaces a weak gas is evolved, and while it is unsuited for use in the manufacture of sulphuric acid it is difficult to arrest by other means. The direction in which improvement is looked for is in the adoption of calciners of the muffle type. By the operation of plant of this kind, sulphur dioxide of a higher concentration will be secured, and its utilisation in the manufacture of sulphuric acid by the Schniedel system—the new type of sulphuric acid plant obviously referred to—will be rendered economically possible. Moreover, the Report foreshadows an additional possibility. It is hinted that sulphide ores might be calcined for the metal manufacturers of smaller output at existing factories. The extent to which this is possible depends largely, of course, on economic and geographical considerations.

## Acid Works Discharges

WHEN we come to sulphuric acid works, we find that chamber plants in general have been very satisfactory—at all events, they have not called for serious criticism; indeed, the average acidity of the exit gases is very low. Comment is made about the coloured discharges from sulphuric acid plants, to which we had occasion to refer recently in these columns. Much that we then foreshadowed is emphasised, particularly the necessity for strictly limiting the quantity of water to be used. We are assured by experts in this matter that with newly-packed Gay-Lussac towers little coloured discharge is observable, but that its intensity increases with the life of the tower. Systematic and vigorous flushing of the filling material with water, in order to remove the accumulation of iron sulphate sludge and other sediment, would undoubtedly have a salutary result, and might render unnecessary the use of a continuous water feed, which cannot constitute other than a disability and may even involve expense in the matter of concentration.

It is gratifying to observe that the adoption of electrolytic methods for the production of caustic

soda and alkali have resulted in a very distinct improvement in the atmospheric conditions in the neighbourhood of these works. At muriatic acid, sulphide, and arsenic works, improvement as regards atmospheric pollution is also noted. Pitch fume is a subject under observation, and the necessity for affording more space below pitch coolers so that heavier stocks can be carried in the beds is urged. All along the line, in fact, distinct improvement is to be noted, and the heavy chemical industry has just cause for satisfaction. We only wish that similar progress could be recorded in the abatement of so-called black smoke, which is no less evidence of pollution than it is of appalling waste.

### Chemical Research at Universities

At the time of its delivery in March a hope was expressed that Professor W. P. Wynne's presidential address on vacating the chair of the Chemical Society would presently be available for more leisureed study. The subject of the address was "Universities as centres of chemical research." The impression left on all who heard it, that it was a singularly clear and useful review of the whole theory and practice of university research, is more than confirmed now that the exact terms are before us in print. The address may be said to repeat for the student, the educationist, and the industrialist of to-day the service that a previous president, Professor Meldola, rendered in the survey of the position and prospects of chemical research in this country with which he closed his term of office in 1907. It measures the distance between the years 1907 and 1925. There is real encouragement to be got from the contrast it furnishes between "the enormous submergence of research talent" that Professor Meldola lamented, and Professor Wynne's considered judgment that "whether it be in the promotion of research associations to aid industry, or in the provision of maintenance grants for the training of graduates in research methods, or in the support of national institutions transferred to its care, the Department of Scientific and Industrial Research has done a service to science and to the country so great as to be almost incredible in the light of pre-war neglect."

Professor Wynne's belief that the growth of the scholarship system, beginning with the Exhibition Scholarships of 1851, largely accounts for the advance in original research is not merely the opinion of one predisposed by his own vocation to the university idea. It is based on a painstaking investigation of statistics, which tell convincingly their own story. The institution during the war of a new research degree of Ph.D. for post-graduate students is recognised as a great step in advance, but Professor Wynne regrets the failure to accompany it with travelling scholarships, enabling the student to have a complete change of surroundings. If Germany before the war could accept the principle of migratory scholarships, the objection or prejudice to it here, he pleads, should not be insurmountable. Coming to the part that the research chemist is to play ultimately in industry, Professor Wynne recognises the practical objection of manufacturers that "the university-trained product is of little use to them, is not adaptable, cannot handle men, and becomes dissatisfied if the reforms which seem so

obvious to him in the management of a works do not commend themselves forthwith to those in charge." The fault, however, is not on the side of the student alone. It is due to the failure of industry generally to make provision for introducing him to works practice. To the proposal to allow students to spend a part of their vacation in actual works training two objections are commonly urged—the first, that secret processes would no longer be protected; the second, that young students admitted into works would be in the way. Against this Professor Wynne quotes the practice in Sheffield for intending graduates in metallurgy to spend part of the long vacation in certain of the steel works under the care of foremen. "If this is possible," he asks, "and there is this close association between the applied chemistry of the metallurgical school and the steel works, in which secret processes, if they exist anywhere, would be likely to be found, is it too much to hope that something of the same kind may be introduced into chemical works for the good of all concerned?" This matter is one of great importance from the standpoint both of education and of getting the fullest value out of education for the benefit of industry. Professor Wynne's address is a contribution of real value in its careful statement and analysis of facts, and in the practical conclusions drawn from them.

### Gasworks Ammonia

Now that the selling price of neutral dry sulphate of ammonia has been reduced to about £12 per ton, which means that the net realisation to by-product ammonia producers will be of the order of about 10 guineas per ton, it is hardly to be imagined that the gas liquor recovery and distillation process can be a remunerative proposition to small or medium-sized works. Moreover, many works are still faced with the difficulty of the disposal of their effluent liquor, and although much excellent experimental work, supported by semi-technical trials, has been undertaken, no really satisfactory solution of the problem is as yet forthcoming. Indeed, one of the most significant observations made by the Chief Alkali Inspector in his recent Annual Report is the following:

"Moreover, it seems by no means certain that with these newer methods of carbonisation the best way of removing the ammonia—at any rate, in large works—is that generally adopted. Is it not possible here also to borrow from coke-oven practice, and so reduce the amount of liquor produced, and incidentally the amount of effluent from the works?"

THE CHEMICAL AGE has always attempted to keep its readers abreast of the times, and in this matter an article published in our issue of August 30 last is of notable interest. In that contribution Mr. Parrish, dealing with some chemical plant problems, said:

"There are not a few instances where the installation of the semi-direct process of sulphate of ammonia can be abundantly justified. At those gasworks where difficulty is experienced in the disposal of the effluent spent liquor, a material contribution to the solution of the problem can be found in the adoption of a semi-direct sulphate of ammonia plant."

This pronouncement cannot be regarded other than as prophetic, in the light of the recent comment of the Chief Alkali Inspector. We can recommend our readers to turn back to the article to which reference is made,

because embodied in it are many practical suggestions, which, if adopted, can be calculated to render the semi-direct process, as applied to gasworks, free from the troublesome occurrences which were a feature of the operation of such plants in the past. Two other considerations occur to us concerning this subject. Both are directed at an economy of manufacturing costs. In December last we indicated that the Billingham works were able to produce synthetic ammonium sulphate at a reduced cost because they took advantage of local supplies of anhydrous calcium sulphate in lieu of sulphuric acid in the manufacture of their product. Mr. William T. Daugherty, the American Trade Commissioner to Germany, reporting on nitrogen fixation and allied industries in Germany, remarks that gypsum is abundant in local deposits. Both the Oppau and the Leunawerke have their own deposits in their production centres, and he further observes that the so-called gypsum process may be considered an important factor in lowering production costs.

Surely there are more supplies than one of anhydrous calcium sulphate in this country, and gasworks chemists may with advantage consider the possibility of its application to their particular process. The other consideration also relates to the technology of the semi-direct process. We recall that the magma of ammonium sulphate, in the process hitherto worked at gasworks, was withdrawn from the absorber and evaporated externally. Why an attempt was not made to form ammonium sulphate within the saturator, so as to obviate the cost of external evaporation, we are at a loss to understand. In any case, we are convinced that it is only necessary to make brief reference to the points, where possible economy may result, to ensure that they will receive the attention which their importance warrants. It is certain that further consideration must be given to the semi-direct process, because therein lies a means of escape from the financial impasse which has been reached at several works as regards ammonia recovery.

### The Coal Crisis

THE situation in the coalfields is at present so serious that it demands the careful consideration of all who are engaged in industry, and it may be useful at this juncture to recall the recent history of what may be described as coal politics. Without discussing the rights and wrongs of the several policies advanced, the following facts seem to suggest that the coal industry is suffering from the present trade depression rather than from want of a rearrangement in the coalfields themselves. In the last thirty years there have been no fewer than six Royal Commissions on mines, and almost within the same period twenty Acts of Parliament have contained special provisions for the regulation of the coal industry, while in the past five years, at least nine official committees have reported upon various phases of the coal controversy. In addition to the Royal and other official committees already mentioned, there exist two statutory bodies whose functions are closely allied to coal questions—the National Board for the Coal Industry, established in 1921, and the Safety in Mines Research Board, of 1922. It is not necessary to discuss the results of these

various official actions to conclude that the trouble in the coalfields is economic rather than political.

The coal trade is suffering from a lack of demand for coal resulting from the present bad state of industry, and without this demand it seems improbable that any rearrangement in the mines can materially alter the situation. One of the principal causes of the depression in which industry finds itself is the burden of high taxation, the lightening of which would release capital needed for the re-establishment of trade. About £360,000,000 now goes annually to the payment of debt, to alleviate which the debt must be converted to lower rates of interest, and this can only be achieved by an improvement in national credit, which depends entirely on reduction in public expenditure.

### Points from Our News Pages

Many important constitutional studies and types of synthetic processes are reviewed by Mr. Rex Furness in his article on "The Constitution and Synthesis of Natural Colouring Matters" (p. 30).

Shareholders offered strong criticism at the meeting of the British Dyestuffs Corporation on Wednesday (p. 34).

Sir Alfred Mond's speech at the Mond Nickel Anniversary dinner (p. 35).

Chemists at Leeds—Programmes of the meetings of the Society of Chemical Industry and the Society of Chemical Engineers at Leeds (p. 36).

Our London market report shows moderate activity with prices steady (p. 44).

Our Scottish market report shows heavy chemicals fairly satisfactory, but orders are restricted (p. 47).

### Books Received

A SUMMARY OF PHYSICAL CHEMISTRY. By K. Arndt, translated by W. H. Patterson. London: Methuen and Co., Ltd. Pp. 92. 3s. 6d.

TABLES ANNUELLES DE CONSTANTES ET DONNÉES NUMÉRIQUES. Vol. V. 1917-1922. Paris: Gauthier-Villars et Cie. Pp. 804.

CHEMICAL ENGINEERING LIBRARY—SECOND SERIES. London: Ernest Benn, Ltd.

AUTOCALVES AND HIGH PRESSURE WORK. By Harold Goodwin. Pp. 161. 6s.

THE THEORY AND PRACTICE OF COMBUSTION. By J. E. Lister and C. Harman Harris. Pp. 150. 6s.

DISTILLATION IN PRACTICE. By C. Elliott. Pp. 188. 6s.

THIONOL COLOURS PATTERN CARD. Issued by The British Dyestuffs Corporation, Ltd., Manchester.

SMOKE. A Study of Town Air. By Julius B. Cohen and Arthur G. Ruston. London: Edward Arnold and Co. Pp. 108. 8s. 6d.

AN ELEMENTARY CHEMISTRY. By E. J. Holmyard. London: Edward Arnold and Co. Pp. 424. 5s.

### The Calendar

|                                      |   |                              |
|--------------------------------------|---|------------------------------|
| 1925<br>July<br>13<br>to<br>18<br>17 | Society of Chemical Industry:<br>Annual Meeting.                | Leeds.                       |
| Aug.<br>26<br>to<br>Sept<br>2        | Institution of Chemical Engineers:<br>Annual Meeting. 9.30 a.m. | Philosophical Hall,<br>Leeds |
| Oct.<br>2<br>23                      | British Association for the Advance-<br>ment of Science.        | Southampton.                 |
|                                      | Engineers' Club: Annual Dinner                                  | Savoy Hotel, London          |

# Constitution and Synthesis of Natural Colouring Matters

By Rex Furness

*In his chapter on "Colour in Nature" in the well-known book, "Chemistry in the Twentieth Century," Mr. Furness dealt at some length with natural colouring matters. Although, in common with the other contributors to the volume, the author indicated his appreciation of the work of investigators of other nationalities, it was natural to find particular stress laid upon the work of British scientists. In the following article, many important constitutional studies and types of synthetic processes are reviewed, including those due to Willstätter and Kostanecki in the flavone group of natural colouring matters, and the brilliant work of Robinson, now materialising after years of patient study, is indicated.*

NATURAL colouring matters have possessed an interest for mankind from time immemorial, and until the development of synthetic dyestuffs manufacture from the seed planted by Perkin in 1858 (by the discovery of mauve) gave rise to a wide range of superior dyes, the natural colouring matters were largely employed—more often with the aid of mordants. To-day, a few natural colouring matters are utilised, but the aim of the worker upon constitutional and synthetic problems in this field is not commercial, for it is probable that these dyes will never come back into general use. The value of this work, apart from the effect it has upon the widening of our knowledge and the general progress of science, lies in the novel methods of synthesis developed, the study of intricate organic chemical reactions, and the production of synthetic organic chemicals which may find undreamed-of applications in the manufacture of medicinals, dyes, perfumes, and all those wonders of the modern organic chemist.

In the following article attention will chiefly be directed to studies in the group of chlorophyll, flavone, and anthocyanidin pigments. Natural indigo will not be treated, although it is possible that the last word has not been spoken upon the economic relationship which this ancient dye bears towards the newer synthetic indigo, especially if a progressive policy be adopted by those most intimately concerned in its production. Natural madder is such a thing of the past that it will also be left unconsidered at this juncture.

Of the relatively few natural colouring matters still employed in the arts and industries, the derivatives of flavone and flavonol such as luteolin, quercitrin bark, old fustic and persian berries are perhaps the most important. Luteolin, the colouring matter of weld, one of the most ancient of European dyes, is still used in the dyeing of certain army cloths and in silk dyeing. The various extracts of quercitrin bark and of persian berries are employed in wool dyeing and in calico printing. Old fustic, used in wool dyeing, is perhaps the most important yellow natural dyestuff to-day, and fairly considerable amounts are produced. Chlorophyll, the colouring matter in the green parts of plants, finds technical application in specific but reasonably limited quantities.

A full review of the uses and constitutions of the important natural colouring matters appears in the chapter "Colour in Nature" in *Chemistry in the Twentieth Century*, a volume specially prepared in connection with the chemical exhibit at Wembley, so that the remainder of this article may conveniently be devoted to a review of constitutional and synthetic studies in the realm of chlorophyll, the flavones and flavonols, and the anthocyanins.

## Chlorophyll

The constitution of chlorophyll has been studied for decades, but the comparatively recent work of Willstätter has been so comprehensive as to merit exclusive attention here. Its synthesis has, of course, not been effected, for its exact constitution cannot be said to be definitely ascertained in full detail, in spite of the brilliantly sustained work of Willstätter and his school. So much has appeared upon this question, that attention will be devoted here to two main lines of investigation, namely, the proof of the presence of magnesium in definite chemical proportion, and the proof of the existence of two distinct forms of chlorophyll, namely, chlorophyll *a* and chlorophyll *b*.

By a series of decompositions effected by means of alkali in alcohol solution, chlorophyll gives the chlorophyll green acids—the chlorophyllins, which have been obtained in pure condition and shown to be magnesium compounds in which the metal is combined with nitrogen, the linkage being of a complex nature. By further decomposition of the chloro-

phyllins, through the agency of alcoholic alkali at 240° C., the phyllins are produced and have been isolated as crystalline individuals. These substances still contain magnesium, and are free acids with progressively smaller numbers of carboxyl groups. Finally, the last carboxyl group can be eliminated, and a compound, still containing magnesium, namely, ætiophyllin,  $C_{31}H_{34}N_4Mg$ , is obtained. The magnesium is not, therefore, present in a carboxyl group in the chlorophyll molecule, and there are only nitrogen-containing groups available for the binding of the metal. Willstätter has definitely shown that the magnesium content of the chlorophyll extracted from a very large number of land and sea plants is constant.

By gentle decomposition of chlorophyll, by means of oxalic acid, the magnesium section of the molecule is detached, and in this way, phæophytin can readily be produced in relatively large quantities for examination. (The question of the two forms of chlorophyll and, therefore, of the two series of decomposition products differing only slightly in composition, will not be discussed at this stage, and chlorophyll will be regarded for the sake of simplicity as a single substance.) Phæophytin is precipitated from an alcoholic extract of green leaves and is obtained free from the colourless and yellow substances present in the leaves. It does not contain magnesium, and the splitting off of the metal is the only change which occurs, when the preparation of the plant material, the extraction, and the treatment with acid are skilfully effected. Phæophytin is a wax-like substance, without acid properties, and is, in fact, weakly basic in character. The similarity of this decomposition product to chlorophyll is evident as soon as a metal is introduced into its molecule. Although it is somewhat more difficult to introduce magnesium than, say, copper or zinc, it has been successfully accomplished by Willstätter, by the use of the Grignard reagent—magnesium methyl iodide. A similar reaction may be effected upon other decomposition products of chlorophyll. Thus, phylloporphyrin,  $C_{31}H_{35}N_4COOH$ , under the influence of acid and magnesium methyl iodide yields the magnesium-containing phyllophyllin,  $C_{31}H_{33}N_4Mg.COOH$ .

Phæophytin behaves like a wax upon saponification with alkalis, and produces—besides high molecular nitrogen-containing acids with 34 atoms of carbon—a nitrogen-free alcohol with 20 carbon atoms. It has been isolated and called phytol. It has the formula  $C_{20}H_{39}OH$ , and is an unsaturated primary alcohol with an open chain of carbon atoms.

The above brief discussion may serve to render comprehensible the following group formula for the colouring matter, chlorophyll *a*, namely,  $[C_{31}H_{29}N_3Mg](NH.CO)(CO_2.CH_3)(CO_2.C_{20}H_{39})$ .

Some of the main decomposition products, briefly noted above, supply evidence for parts of this group formula, but for a full consideration of the assumed atomic linkages, the lactam ring which serves as a chromogenetic grouping in the molecule, the tentative structural arrangement of the molecule, etc., the original papers of Willstätter should be consulted.

Passing to a consideration of the proof that two forms of chlorophyll exist, namely, chlorophyll *a* and chlorophyll *b*, Willstätter showed that in carefully controlled decompositions of phæophytin, two, and only two, crystalline and characteristic substances, namely, phytochlorin *e*,  $C_{34}H_{36}O_5N_4$ , and phytorhodin *g*,  $C_{34}H_{32}O_6N_4$ , are produced. These substances are not fragments produced by the breaking up of the phæophytin molecule, for their molecules are of the same order of magnitude as that of phæophytin itself. They are not inter-convertible and are formed in definite weight proportions. One of them cannot represent, therefore, an earlier

and the other a later stage of the decomposition of phaeophytin. Thus, the formation of two distinct decomposition products of this nature demands the assumption that phaeophytin, and consequently chlorophyll itself, is a mixture of two components, one of which furnishes phytychlorin *e* and the other phytyrhodin *g*.

The two components of chlorophyll can be separated by dividing them in an unequal manner between two solvents, say, methyl alcohol or aqueous methyl alcohol and petroleum ether. By systematic fractionation and continued rearrangement of the relative proportions of the components in the immiscible solvents, a final separation of perfectly homogeneous chlorophyll *a* and chlorophyll *b* results. The method is simple in outline, but demands manipulative skill of a high order and, perhaps, a long experience in dealing with such separations.

Chlorophyll *a* is bluish green in appearance and chlorophyll *b* is yellowish green, and in spite of differences in optical behaviour, their compositions are only slightly different. The latter and its derivatives may be assumed to be derived from the corresponding *a* compounds by the replacement of two hydrogen atoms by one oxygen atom, and the formulae suggested are respectively  $C_{55}H_{72}O_5N_4Mg$  (*a*) and  $C_{55}H_{70}O_6N_4Mg$  (*b*).

The formulae for phytychlorin *e* and phytyrhodin *g*, given above, differ similarly—two hydrogen atoms replaced by one oxygen atom.

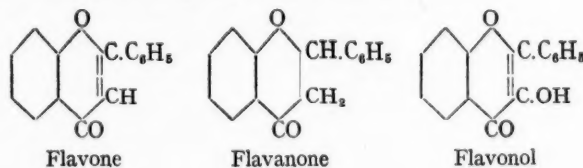
Willstätter and his associates have so developed their experimental procedure that they can isolate a pure chlorophyll product in a few hours from dried leaves, with a yield of about 80 per cent. of the theoretical, or, say, 6.5 gms. from one kilogram of dried leaves. Thus, they have been able to demonstrate the identity of the chlorophyll existing in a large number of different land and sea plants. The relative proportion of the *a* and *b* varieties may differ. In addition, the relative amounts of chlorophyll and the associated carotinoid pigments present in green leaves and marine algae differ considerably.

The study of the constitution of chlorophyll is of fascinating interest, and the step by step development of the brilliant work of Willstätter should be followed through the original papers. The above can only be a vague outline, but it may serve to stimulate curiosity or alternatively to give a general grasp of two main lines of investigation, namely, the proof of (1) the presence of magnesium and (2) the existence of two forms of the pigment.

#### The Flavones, Flavanones and Flavonols

The chief yellow colouring matters of nature belong to these groups—luteolin is a flavone, butin (the yellow dye used in religious ceremonial in India) is a flavanone and quercitron bark, old fustic, Persian berries, etc., are flavonols. Very many more exist, but all are derivatives containing more or less hydroxyl groups in the basic compound. It will economise space and make for clearer reading if the syntheses of flavone, flavanone and flavonol themselves are given. It will be understood that very slight modifications in the starting materials will give the hydroxy derivatives which constitute the colouring matters, such as quercitron bark, etc.

The work in this field is largely due to Kostanecki. The similarity in constitution between the three parent bodies is readily seen from the following formulae, slight differences in the  $\gamma$ -pyrone ring only being observed.

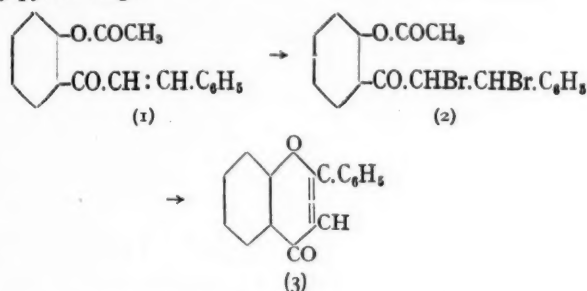


#### Flavone

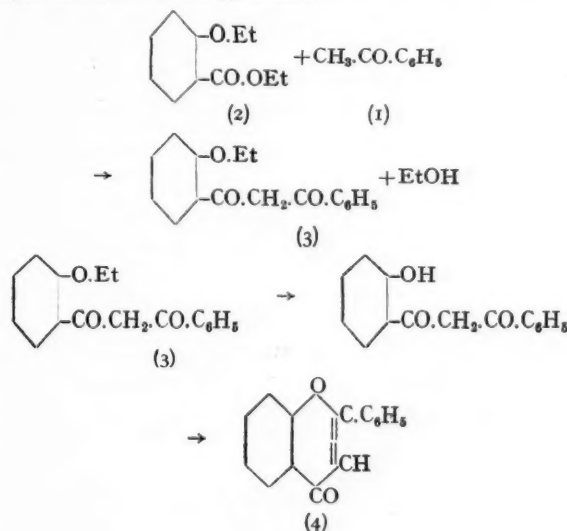
Two methods only need be indicated here, the first representing the original method of Kostanecki, and the second also due to this brilliant chemist, the method which has had such fruitful results in the synthesis of flavone derivatives occurring in nature—*e.g.*, chrysin, apigenin, etc.

(A) Acetyl-*o*-hydroxy-benzylidene-acetophenone (1) easily

gives a dibromide (2) which, when reacted upon with alcoholic potash, leads to the production of flavone (3) by the loss of hydrobromic acid and by the hydrolysis of the acetyl group, with subsequent ring closure at this point to furnish the  $\gamma$ -pyrone ring.



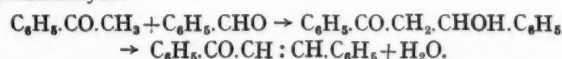
(B) By the condensation of acetophenone (1) with ethyl-*o*-ethoxybenzoate (2) in the presence of sodium, *o*-ethoxybenzoyl-acetophenone (3) is obtained. When digested with hydriodic acid flavone (4) results.



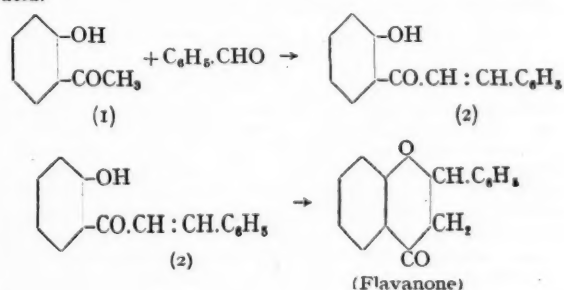
#### Flavanone

The chalcones and flavanones occur in nature somewhat sparingly and their importance here resides in the fact that their syntheses are stepping stones to the syntheses of the far more important flavonols.

Chalcone is easily obtained on condensing acetophenone with benzaldehyde.

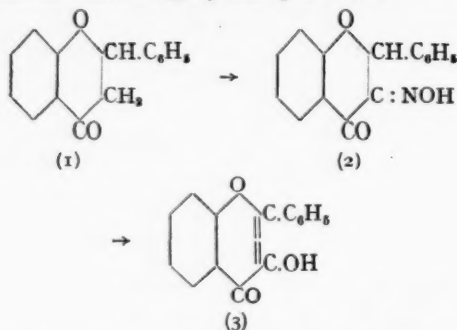


Ring closure to form flavanone is readily effected by boiling a chalcone derivative (2) possessing a suitably disposed hydroxyl group (prepared by condensing *o*-hydroxy-acetophenone (1) with benzaldehyde) with dilute alcoholic sulphuric acid.

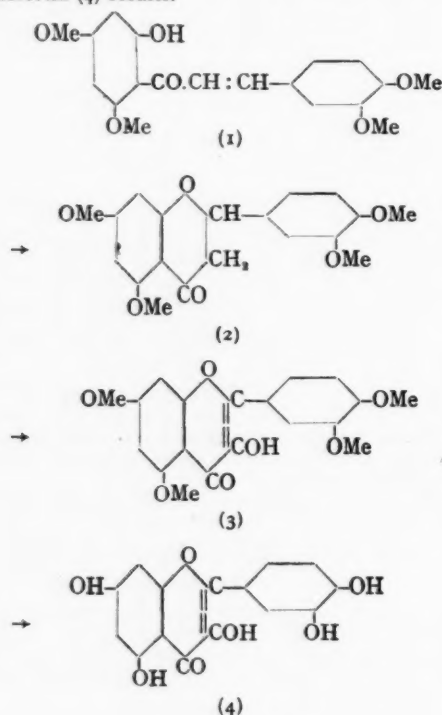


### Flavonol

Flavonol itself was synthesised by Kostanecki by the action of amyl nitrite and hydrochloric acid in alcoholic solution upon flavanone (1), the synthesis of which has been indicated above. The isonitroso flavanone (2) is readily converted into flavonol (3) by boiling with acid.



By the use of appropriate chalcone derivatives, passing to flavanones and thence to flavonols, many natural flavonols have been synthesised and the single example of quercetin may be given. The chalcone, 2-hydroxy-4:6:3':4'-tetramethoxy-benzylidene-acetophenone (1) is converted into the flavanone (2) by boiling with alcoholic sulphuric acid. The flavanone is then converted into the flavonol (3) by means of the isonitroso reaction. The compound (3) is demethylated and quercetin (4) results.

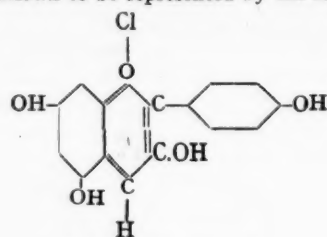


### The Anthocyanins

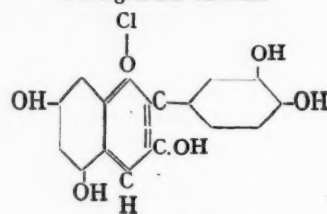
The members of the anthocyan group of natural colouring matters are responsible for many of the most beautiful colour effects in our flowers and fruits. They possess no technical importance but have been studied with conspicuous success by Willstätter, Everest, Perkin, and others. If the work of the first is considered exclusively here, it is not to be inferred that British workers have played no part in these constitutional studies. Moreover, in recent years, brilliant synthetical work at the hands of Robinson has advanced the subject still further.

Only a brief descriptive introduction will be given of the colouring matters at this juncture, so that we may pass on to the synthetical work alluded to. The characterisation of the

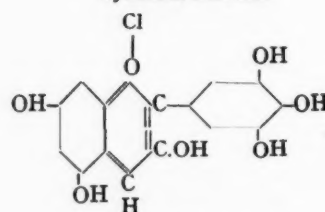
colouring matters of the cornflower, rose, dahlia, pelargonium, poppy, aster, chrysanthemum, pansy, larkspur, etc., and of fruits such as cherry, plum, etc., and their isolation in pure form, has been a labour of extreme difficulty, but Willstätter has been able to show that they belong to one main class, the anthocyanins. They are glucosides of one or other of three basic anthocyanidins or their derivatives. Thus, the three classes of anthocyanins, namely, the cyanins, the pelargonins and the delphinins, are glucosides of the compounds cyanidin, pelargonidin and delphinidin. The latter compounds are known to be represented by the formulae.



Pelargonidin Chloride



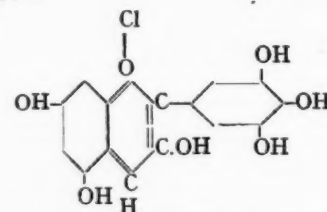
Cyanidin Chloride



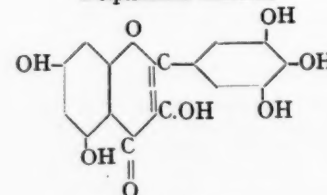
Delphinidin Chloride

The exquisite colourings of our flowers are due in many cases to the presence of different anthocyanins in varying amounts, different concentrations in the cells and other causes, whilst the anthocyanins themselves differ in the basic anthocyanidin present, the number and place of attachment of the sugar residues in the glucosides (the anthocyanins), and to other factors.

The anthocyanins are closely related structurally to the flavonols, as will readily be seen by considering the following two formulae:—



Delphinidin Chloride

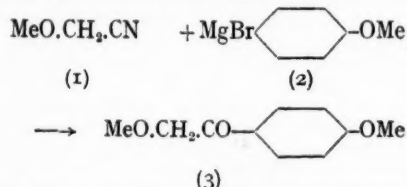


Flavonol Derivative

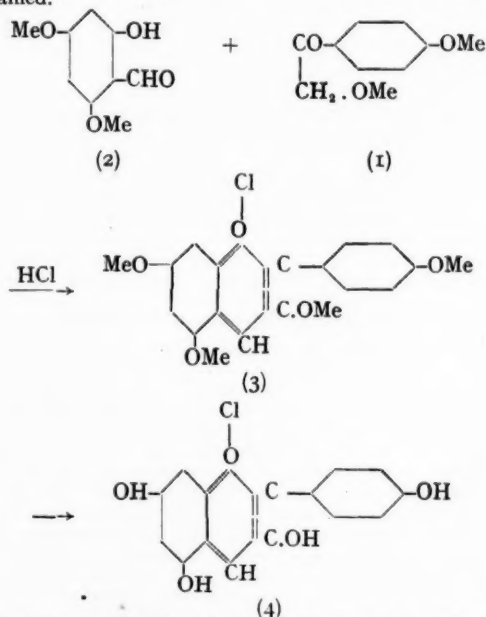
This structural arrangement for the anthocyanins was suggested by Everest and confirmed by synthetical work at the hands of Willstätter,\* but a greater step forward is now evident in the work of Robinson, who, after years of preparatory work, has succeeded in synthesising pelargonidin chloride. Further work in this field continues, and results of interest and importance are appearing. It is proposed to indicate here the steps leading up to the synthesis of pelargonidin chloride itself, which was proved identical with Willstätter's natural product, and briefly to describe the strikingly novel methods of synthesis now available for further penetration into the anthocyan series.

*w*-4 : dimethoxyacetophenone (3) is the starting material for the synthesis of pelargonidin chloride and was prepared as follows. An ethereal solution of methoxy-acetonitrile (1) was gradually added, with cooling, to a solution of magnesium anisyl bromide (2). The colourless additive compound separated at once and after allowing to remain during twelve hours the mixture was decomposed by ice cold water and then by means of cold dilute sulphuric acid. The separated ethereal layer was washed with aqueous sodium carbonate and water and dried by anhydrous sodium sulphate. After removal of the solvent the residual oil was distilled under reduced pressure.

The mechanism of the synthesis follows that well known in Grignard syntheses, and the intermediate addition compounds need not, therefore, be indicated here.

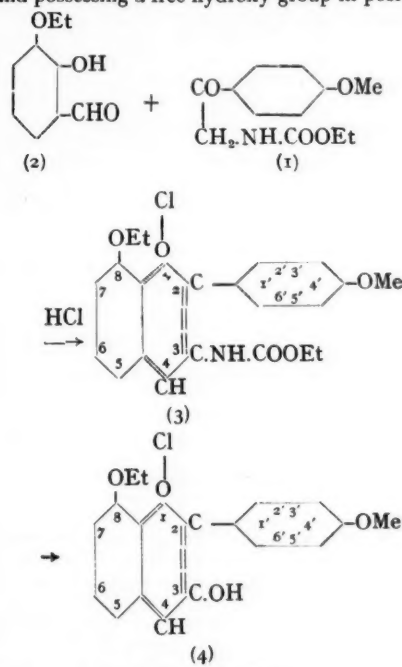


*w*-4 : dimethoxyacetophenone was then used in the synthesis of pelargonidin chloride, as follows:—Reaction of this compound (1) with 2 : hydroxy-4 : 6-dimethoxy-benzaldehyde (2) in ethereal solution in the presence of hydrochloric acid gives tetra-methoxy-pelargonidin chloride (3). By subsequent demethylation pelargonidin chloride (4) itself was readily obtained.



In the hope of synthesising partially methylated derivatives of the anthocyanidin series, the use of acetoxy acetophenone suggests itself, so that, after suitable condensation, an acetoxy group and, therefore, later a hydroxy group might be found in position 3 in the benzopyrylium derivative formed. The

conversion of acetophenone, however, into a hydroxy acetophenone is a formidable operation, and a method to produce poly-hydroxy-acetophenones or even their acyl derivatives has yet to be discovered. Robinson has developed very recently a route *via* the amino-acetophenones which, on the other hand, are readily accessible from the acetophenones. Thus, *w*-carbethoxy-amino-*p*-methoxy acetophenone (1) was readily prepared, and upon condensation with 2-hydroxy-3-ethoxy-benzaldehyde (2), 3-carbethoxy-amino-4'-methoxy-8-ethoxy-2-phenyl-benzopyrylium chloride (3) was obtained. When heated on the steam bath with 20 per cent. hydrochloric acid, considerable decomposition occurred, and 3-hydroxy-4'-methoxy-8-ethoxy-2-phenyl-benzopyrylium chloride (4) crystallised from the solution after cooling. Thus, a route is opened to the synthesis of partially methylated benzopyrylium salts and derivatives—partially methylated anthocyanidins—as is evident from the following structural formulæ. This is specially the case for those related to delphinidin and possessing a free hydroxy group in position 3.



#### Automatic Temperature Regulators

THE Cambridge Instrument Company, Ltd., 45, Grosvenor Place, S.W.1, have issued a catalogue describing their automatic temperature regulators. These are used in many industrial processes, and are being employed to control the temperature in melting pots for lead, tin, etc., and in dye vats, enamelling ovens, and furnaces for the heat treatment of high-speed steels and alloys. Each outfit comprises a sensitive element exposed to the temperature to be controlled and connected to an indicator, which is fitted with a device whereby the supply of heat is automatically reduced as soon as the temperature exceeds a definite value, and increased when it falls below that value. The regulators can also be arranged to operate electric lights, Klaxon horns, and other signals when a predetermined temperature is reached. The apparatus can be used to control automatically the temperature of the air in cold rooms, hospitals, theatres and so on, and the makers will supply information of suitable outfits on being furnished with details of the conditions of use required.

#### No Duty on Indian Magnesium Chloride

THE application for a protective duty on magnesium chloride has been rejected by the Indian Tariff Board. Before recommending such a duty, the Board requires proof that the industry which applies for it will eventually be able to face world competition without assistance. In the opinion of the Board the magnesium chloride industry fails to meet this test.

\*Willstätter has recently described further elaborate synthetical work in this field.

## British Dyestuffs Corporation

### Shareholders' Criticism at General Meeting

THE sixth ordinary general meeting of the British Dyestuffs Corporation, Ltd., was held at Manchester on Wednesday. Lord Colwyn explained that it had been fixed for that date in order to comply with the requirements of the Companies (Consolidation) Act, 1908, and the Corporation's own articles of association, and as it had not been possible in the time available to prepare the accounts and the scheme of reconstruction referred to in a circular issued on May 7, the directors proposed to confine the business to the re-election of directors and auditors and then adjourn the meeting to a date to be fixed.

One or two shareholders thereupon suggested that the re-elections should be left over until the next meeting, and to this Lord Colwyn consented.

Mr. J. R. Farrar, Registrar of the Halifax County Court, said that the shareholders would like information concerning the profits that had been made or that had not been made during the time the present board had been in existence. During the last twelve months considerable profits had been made in the textile trades in both Lancashire and Yorkshire. How was it that in the allocation of those profits an appropriate proportion had not come to the shareholders of the Corporation? And there was another matter. The constitution of the Corporation provided that it should be carried on by two partners, one being the shareholders and directors, and the other the State. When two partners entered into association with each other for trading purposes they should be animated by the one paramount object of benefiting the trade they were pursuing. The paramount object represented by the shareholders and of the board then meeting them was that of the furtherance purely and simply of the production of their wares at a commercial profit. The State, on the other hand, had two objects, one political and the other, possibly, commercial. The shareholders had a right to know whether their partner was carrying on its associations and duties with the Corporation with the good faith which one partner had a right to expect from another. That was a matter which, he thought, had been severely tested during the last five years. During that time the Corporation had had to compete with dye wares imported from abroad under licence and also with reparation dye wares. With regard to the first it was not possible for anyone to criticise the action of the board; their hands, he imagined, had been forced. But as regards the reparation dye wares received from Germany the position was different. Uncontradicted statements had been made that large profits had accrued to their partner from reparation dyes and some had gone so far as to say that the profits made from them should have gone to the furtherance of the objects of the establishment of the dye-making industry in England, particularly of the British Dyestuffs Corporation. Whether or not that was a proper statement to make he would not say, but the question did arise as to whether, in making this profit, their partner, the State, showed the good faith they had a right to expect. Lord Colwyn assured the shareholders that the mind of the board was centred deeply upon the problems they had to face. As the shareholders knew, they had appointed a managing director. He was with them that day and they were hoping that the great task on his shoulders would be carried out to the success of the undertaking and the welfare of all its constituents.

### Position of Investors

Major Gillam, of Sowerby Bridge, supporting Mr. Farrar, said that the position of those who had invested money in this national concern had been, and was up to date, deplorable. This industry was carrying out very important—he might almost say essential—national work. What was the nation going to do for this concern, which was carrying out this national work, national experiments, and the training of its personnel? When they subscribed the public were aware of the Government's backing, and had a right to suppose that their investments were not only patriotic ones but sound financially. But in this short space of time their position had been considerably altered. They knew now that quite apart from the licences granted for the importation of, roughly, 5,600 tons of dyestuffs into this country during the last four years from all sources, no less than 7,400 tons had been imported as reparation dyestuffs during the same period from Germany, and it had been estimated that the Government had

made profits of hundreds of thousands of pounds out of the sale of those dyestuffs.

The Government was in partnership with this concern and had members on the Board, and the profits the Government had made had not assisted the concern. The shareholders had received no dividend for years, and the one pound shares now stood at 10s., 4s. 6d., or 2s. 6d., according to the section. In fact, while the Government had been making profits out of dyestuffs they had left the producers, shareholders, and users of dyestuffs—all who had attempted to build up this national concern—in the cold. The shareholders were looking to the directors to obtain fair and liberal treatment.

The Chairman, replying to a question as to whether it was correct that the new managing director was to have £10,000 a year, said he did not think it was correct, but the shareholders could be certain that no salary would be paid to anyone unless he was worth it. On the other hand, any man who could make the organisation efficient and strong would be worth any money they could pay.

The Shareholder: Quite so, but it seems a big sum for a sinking ship.

The Chairman: Don't call it a sinking ship. Perhaps there are better times coming.

The resolution adjourning the meeting to a date to be fixed was then adopted.

### Germany's Benzol Production

OWING to the after-effects of the passive resistance and the strike in May the production of benzol was relatively small during the first six months of 1924. Once these difficulties had been surmounted, however, the output steadily increased, according to a report of the Benzol Association at Bochum. The Association's production for the whole year amounted to 94,000 tons, its sales totalling 75,000 tons.

The Customs barrier set up by the Occupying Powers and retained up to September 10, on the eastern frontier of Occupied Territory rendered goods traffic with Unoccupied Territory very difficult and led to increased prices. After the Customs barrier had been raised sales of benzol were checked temporarily by the great money and credit shortage which set in towards the middle of the year. This, however, was followed by an increased demand for benzol which assumed such proportions that the amounts at the disposal of the Benzol Association were in no way sufficient; this demand was due in the first place to the improvement in the general economic position in Germany, which became evident from the increase in the requirements of motor fuel. The ever-increasing demand for benzol may, however, be due mainly to the extensive propaganda undertaken by the Benzol Association. Whereas in Germany prices of benzol remained up to the middle of 1924 at the level of heavy benzene, from that time they gradually approached light benzene values, attaining the latter towards October, and by the end of the year even surpassing them by 20 per cent. The present year has brought about a reduction in benzene prices and an increase in the import of benzol to Germany, while compulsory deliveries to France have ceased.

### A Universal Identification Project

At a dinner given by British Monomark, Ltd., at the Hotel Victoria, London, on Thursday, Mr. William Morris explained to a gathering of Press representatives the principles of his scheme which is to be embodied in the workings of Monomarks.

Briefly stated, the idea is a system of universal identification whereby firms or individuals may claim a distinctive sign—such as B.C.M. 5276—a mark that will not be duplicated the world over. The importance to manufacturers can be estimated by the fact that Monomarks will be more than a trade mark, they will be, in short, a code representation of the country of origin and the manufacturer's name and address. The key will be in the hands of the Company, which will put inquirers in touch with one another, forward letters and generally act as the liaison between buyer and seller. The prefix will denote the country of manufacture.

It is a system that has untold possibilities and the backing of many great business brains in this country and abroad. Further, it is in its infancy as regards practical application, but in the near future it will be the subject of broadcast publicity and as such will warrant the attention of all industries and of the technical and trade Press.

## Anniversary Dinner of The Mond Nickel Co.

### The Chairman's Speech

*A dinner to celebrate the twenty-fifth anniversary of the Mond Nickel Co. was held on Thursday evening at the Savoy Hotel, London. In our last issue we gave a brief summary of the history of the company, and we print below a report of the speech made by Sir Alfred Mond at the commemorative dinner.*

In replying to the Hon. Howard Ferguson, Prime Minister of Ontario, who proposed the toast of the company's twenty-fifth anniversary, Sir ALFRED MOND, chairman of the company, said that Ontario was the premier province of Canada, and had immense mineral wealth. The Government had always treated the mineral interests with fairness and justice, and he was glad to say so in reply to its Premier on this occasion. In the great slump which followed the war, the Mond Nickel Co. was the only concern which continued to operate in the Sudbury district of Ontario, a fact of which the company was proud, because it had been greatly appreciated in the district. The nickel key which was presented to H.M. the King at the recent opening of the Canadian building in Trafalgar Square was made from Mond nickel derived from the Ontario mines.

The CHAIRMAN then referred to the distinguished company, which included representatives of the Government, of trade and industry, learning, science and the professions; and among those who had accepted invitations to be present were Lord Aberconway, Professor Henry Armstrong, Lord Ashfield, Sir Arthur Balfour, Sir John Brunner, Mr. Roscoe Brunner, Viscount Burnham, Sir Joseph Cook (High Commissioner of the Commonwealth of Australia), Prince Ginori Conti, Sir Robert Falconer (President of the University of Toronto), Sir E. J. Ellis-Griffith, Sir Robert Hadfield, Sir Frank Heath, Sir Samuel Hoare, Sir Thomas Holland, Mr. Emile Mond, Mr. Robert Mond, Professor G. T. Morgan, Sir William Pope, Sir John Russell, Dr. A. C. Seward (Vice-Chancellor of the University of Cambridge), Professor N. V. Sidgwick, Professor T. Turner and Lord Weir.

#### History of the Company

Relating the early history of nickel, Sir ALFRED said that it was in copper and the non-ferrous metals that the influence of nickel was first recognised, and, as long ago as the third century B.C., a nickel-copper alloy was used for coins. Going on to discuss the nickel process, he said that it was the outcome of the discovery made in 1889 by Dr. Mond, who carried on experiments with Dr. Langer and Dr. Quincke. He was proud to say that Dr. Langer was present with them that night and was still the technical head of the company. In the course of some experiments to eliminate carbon-monoxide from hydrogenous gases, they found that nickel had the remarkable property of combining with CO to form a gaseous compound, which was named Nickel Carbonyl and following this the erection of works at Clydach was started in 1900, with a capacity of 1,000 tons of nickel per annum. The company was renowned for the production of specially pure nickel which was of exceptional value for high-grade work. This was demonstrated during the war, particularly in the manufacture of cupro-nickel, for such purposes as bullet cover envelopes. A remarkable increase in the company's capacity of production had taken place since the formation of the company, the original capital being £600,000, which to-day had grown to £4,650,000.

Sir ALFRED went on to say that the range of nickel steels, usually taken as covering compositions up to 10 per cent. of nickel, forms only one section of the work of nickel in the various fields. During recent years, a whole series of most valuable alloys containing from 30 per cent. and upwards of nickel had been discovered, and applied to industry, their most striking properties being not only their high resistance to corrosion and great mechanical strength, but their exceptional electrical and mechanical qualities. Special reference was made to the latest addition to this field, an alloy containing 78 per cent. nickel, which in recent experimental work might be said to have revolutionised long-distance telegraphy and telephony, enabling the speed of the transmission of messages to be more than quadrupled. An alloy of iron and nickel containing 30 per cent. of nickel had an electrical resistance

more than seven times that of either iron or nickel singly, and was now a valuable adjunct to the mechanical engineer. It was found that a further addition of 6 per cent. nickel produced a still more surprising result, a material which possessed practically no co-efficient of expansion, called "Invar," which had uses of first-rank importance in scientific apparatus and other applications.

#### Nickel Alloys

Turning to the subject of nickel-copper alloys, the CHAIRMAN said that these had been known for many centuries, but only during the last generation had been developed to any appreciable extent. An addition of only 2 per cent. of nickel doubled the strength of copper at high temperature, and an addition of 15 per cent. was sufficient to de-colourise it and form a white alloy, combining with great mechanical strength a silvery whiteness of colour and high resistance to corrosion. The most successful modern development in alloys, however, was the discovery of the really astounding properties attached to the nickel-chromium series. Sir ALFRED said that important work had been carried out by the National Physical Laboratory, in conjunction with the British Non-Ferrous Metal Research Association, and that the alloys were produced under the company's own supervision. One of these materials, containing 80 per cent. of nickel had a strength as high as 40 tons per square inch, at 600° C., but even at 800° C.—a temperature at which nearly all other metals and alloys had scarcely any mechanical strength at all—a figure of nearly 20 tons is obtained. This material had also successfully survived an elaborate series of tests under continuous load for many days at temperatures of the order of 800° C., and it was not too much to say that they had realised unhopd-for possibilities in the fields of mechanical and electrical engineering. Alloys of this type had filled an entirely new place in electrical engineering, for it was these materials which had made possible the great developments of electrical heating. Domestic electric fires, toasters, laundry irons, boiling kettles, cooking rings and ranges, etc., all depended upon these alloys for their heating elements. The intensive work of industrial metallurgists during the last few years had so vastly improved their reliability, that under reasonable conditions electrical appliances were now as dependable as the old-fashioned fire grate.

#### Copper Sulphate

The CHAIRMAN then called attention to the great interest taken by engineers of all classes in the problem of corrosion of metals, which showed that in nickel alloys, a range of materials was available which was unquestionably in the front rank of corrosion-resisting metals. This applied particularly to the nickel-copper alloys containing a high percentage of nickel, and to the nickel-chromium alloys. In regard to copper sulphate, for every ton of nickel pellets manufactured by the company, about four times their weight of copper sulphate crystals resulted. The output was mainly sold on the Continent, and particularly for use in vineyards. A considerable quantity was also used to ensure potato crops in Great Britain and Ireland against blight, and during the war, when the food situation was critical, thousands of tons of potatoes were saved in Great Britain by means of this fungicide. Salts were also produced in large quantities and used for electroplating, for hardening oils, and for the construction of alkaline storage batteries.

Sir ALFRED MOND concluded his speech by saying that the history of nickel was indeed romantic and not less so was the progress made during the past 25 years of the company's history. Following the Chairman's speech, the toast of "Science and Industry" was proposed by Viscount Haldane, and speeches were made in response by Sir Philip Cunliffe-Lister (President of the Board of Trade) and Professor Horace Lamb (President-Elect of the British Association).

## Society of Chemical Industry

### Annual Meeting at Leeds

THE annual meeting of the S.C.I. is being held at Leeds this year from July 13 to 18. The programme includes business meetings and receptions as well as the usual visits to chemical works. In addition to the technical papers to be read, of which a list is given below, on July 14, Prince Conti, honorary member of the society, will read a paper on "The Manufacture of Tuscany Boric Acid."

TUESDAY, JULY 14.

11 a.m. Annual General Meeting of the Society. Address by the President on "Dyestuffs."

WEDNESDAY, JULY 15.

9.30 to 11.30 a.m. Symposium on "Coking Practice," at which Professor J. W. Cobb, C.B.E., Department of Coal Gas and Fuel Industries, The University, Leeds, will preside.

The following papers will be contributed:

- (1) "The Influence of Ash Constituents on the Coking Process," by R. Lessing, Ph.D.
- (2) "The Heating of Coke Ovens," by R. A. Mott, M.Sc., A.I.C., and R. Wigginton, M.Sc., Department of Fuel Technology, The University, Sheffield.
- (3) "The Disposal of Coke Oven Gas for Public Supply," by C. P. Finn, B.Sc., F.I.C., Manager, Coke Ovens, Manvers Main Collieries Co., Ltd.
- (4) "A Comparison of Different Solid Adsorbents proposed for Benzole Recovery," by W. H. Hoffert, M.A., B.Sc., A.I.C., Research Chemist to the Joint Research Committee, National Benzole Association and the University of Leeds.

THURSDAY, JULY 16.

9.30 to 11 a.m. Symposium on "Smokeless Fuel," organised by the Chemical Engineering Group.

The following papers will be contributed:

- (1) "Smokeless Fuel—the Present Position and Future Possibilities," by C. H. Lander, D.Sc., Director of Fuel Research under the Department of Scientific and Industrial Research, and Dr. Margaret Fishenden.
- (2) "Solid Smokeless Fuels: their Production, Properties and Use," by Edgar C. Evans, B.Sc., F.I.C., National Federation of Iron and Steel Manufacturers.
- (3) "A Study of the Tars and Oils obtained from Coal," by F. S. Sinnatt, M.B.E., M.Sc.Tech. (Manc.), F.I.C., M.I.Min.E., Assistant Director of the Fuel Research Board, and J. G. King, B.Sc., F.I.C., Chief Chemist to the Fuel Research Station.

### Engineers' Annual Meeting

The third annual corporate meeting of the Institution of Chemical Engineers takes place in the Philosophical Hall, Leeds, on Friday, July 17, 1925, at 9 a.m. This will be followed at 9.30 a.m. by a joint meeting with the American Institute of Chemical Engineers.

Presidential addresses will be delivered by the President of the American Institute—Dr. Charles L. Reese, and the President of the British Institution—Sir Arthur Duckham. These will be followed by a symposium on "Industrial Water Supply and Stream Pollution." The following papers (at 10.30) will be read:—(a) "Woolscouring Waste Liquors, Composition and Disposal," by F. P. Veitch and L. C. Benedict; (b) "Effluents from Ammonia Plants and Their Disposal," by T. Lewis Bailey, Ph.D., F.I.C.; (c) "Distillery Waste Liquids and Their Purification," by R. D. Littlefield, F.I.C.; (d) "Statutory Regulation of Stream Pollution and the Common Law," by E. B. Besselièvre; (e) "The Preparation and Comparative Performance of Base-Exchange Materials in Water Softening," by E. B. Higgins, D.Sc., Ph.D., and J. P. O'Callaghan, F.C.S.; (f) "Recent Experience of Doucil in Water Softening," by T. P. Hilditch, D.Sc., F.I.C.; (g) "Electrolytic Conductivity and Hydrogen Ion Control," by H. C. Parker; (h) "The Absorption of Hydrochloric Acid and Some Data Regarding the Tyler-Vitreosil System," by S. L. Tyler; (i) "The State *versus* Industry, or The State With Industry," by W. L. Stevenson; (j) "Pioneer Studies by the Bureau of Chemistry on Pollution of Shellfish Areas," by J. W. Sale.—Discussion will follow.

After the meeting, the American visitors, with a party from the British Institution, will journey to Glasgow, where hospitality has been offered by the City Corporation and by Nobel Industries, Ltd. Edinburgh will also be visited, and

two days spent in the Lake District, after which the party will proceed to Chester, and a visit will be paid to Joseph Crosfield and Sons, Ltd., and United Alkali Co., Ltd.

The Institution is holding its annual dinner in Chester on the evening of Saturday, July 25, and the party will proceed to London on the following day *via* Stratford-on-Avon. After three days in London, during which Wembley will be visited, the American guests will leave for the continent.

## British Association of Chemists

### The Legal Aid Department

THE activity of the Association in the matter of legal aid has always been satisfactory and tends to increase.

It is in no way paradoxical to assert that it is the Association's principal boast that this department has seldom found it necessary to take a case to court. This does not mean that a few cases only have been dealt with, but that they have almost always been settled out of court. The department does not, and will not, hesitate, however, to institute legal proceedings where its legal representatives advise it. The question of agreements is also one in which the department is very interested, and it is always ready and willing to discuss such matters with those members who may require advice as to the legality or equity of any agreement they may have been required to sign. Once an agreement is signed it is always extremely difficult, and generally impossible, to seek a remedy in law, whereas if the matter is taken up before the agreement is entered upon, it is frequently possible, without friction, to set the matter right. All members are urged to refrain from signing any agreement without seeking the free legal advice that the Association is prepared to give.

A legal aid department organised in the way in which the Association has organised it is invaluable, and it is gratifying to know that the number of cases where appeal to the Association is made is relatively small, and, because of our activity in this direction, we believe that they tend to decrease. The legal action of an organisation is almost always more effective than that of an individual, and nothing tends to strengthen the prestige of an organisation so much as the assurance that it is in the best sense a protective body, and we would urge all non-members to consider this aspect of the case.

The Association on this ground alone is worthy of the support of chemists, and provided always that its cause is just, upon its numerical strength, the weight and authority of its legal cause will depend. The weightier that cause also, the weightier the prestige of the individual chemist and of the whole profession. Every legal case successfully fought will help to establish some precedent, and it is upon precedents that the dignity of a profession rests.

### Unsatisfactory Agreements

By insistence upon the importance of legal aid, it might appear that an indirect indictment of the employer is implied, but this is not at all the case. In the large majority of cases perfectly equitable arrangements are arrived at, but this can scarcely be described as the rule while it admits of even a few exceptions which it is the special function of the Legal Aid Department to correct. There are besides certain agreements which, though perfectly valid in law, no chemist ought to sign or to be called upon to sign. As example may be cited that type of document which binds the employee for a term of years while the employer is left free to give the employee notice upon the expiration of a short term of service. There is reason to believe—the Association can claim at least indirect responsibility—that this type of agreement is far less common than formerly, but that it should be possible at all is a serious indictment of the present system.

All chemists therefore are urged to support the necessary principle of legal aid by becoming members of the Association. While the Legal Aid Department deals with the law as it is, the Association is further concerned with the law as it should be. In such questions as the title to be applied to chemists, and the proper regulation of entry into the profession, the Association is closely interested, but to move decisively in these matters a largely increased membership is necessary.

All inquiries should be addressed to the General Secretary, The British Association of Chemists, "Empire House," 175, Piccadilly, London, W.1.

H. T. F. R.

## The Process of Evaporation

### Investigations in Denmark

THE results of some experiments undertaken in the General Technical Chemistry Laboratory of the Royal Technical College, Copenhagen, are contained in a pamphlet by Messrs. F. C. Becker, C. Janholm and P. E. Raaschou, which has been sent to us from Denmark. The publication is entitled "The Drying Process," and gives an account of some work done in order to elucidate certain phases of the process under technical conditions. The experiments made served to revise the early work on the phenomenon of evaporation, and some very interesting results appear to have been reached regarding Dalton's original formula.

The rate of evaporation was investigated in relation to external conditions, namely, to the velocity of air, the drying temperature, and the quantity of moisture in the drying air. An experimental apparatus was constructed for the purpose, consisting of a series of pipes in connection with an air fan, anemometers, heating apparatus, and a drying drum. By means of the fan, free air was made to enter the apparatus, and through the anemometer, mixing chamber and heater, whence it travels by way of the drying drum to the exterior, a system of valves operating between the various parts of the apparatus.

### Experimental Results

During the tests measurements were made of (1) the temperature at various points of the system, (2) the degree of humidity in the drying air at various points of the system, (3) the quantity of water evaporated at any moment, and (4) the quantity of drying air. The results of these experiments were graphed, and from the diagram so obtained were deduced the rate of evaporation, the velocity of air, and the drying temperature. The relative humidity of the air was measured by means of Asmann's psychrometer. From the results of the tests made, the following formula for the rate of evaporation was deduced:

$$h = K \cdot \sqrt{v} \cdot (T - T_D)$$

where

$h$  is the rate of evaporation (kilograms per hour),

$K$  is a constant,

$v$  is the quantity of air (cubic meters per hour),

$T$  is the mean temperature of the drying air in degrees Celsius, and

$T_D$  is the mean temperature of dew point of the drying air.

By use of this formula for calculation of the rate of evaporation, deviations are found varying from - 18 % to + 28 % between the calculated values and those found by experiment, the value used for the coefficient  $K$  being the mean value of the  $K$ 's found from the individual experiments by insertion of the known values of  $h$ ,  $v$ ,  $T$  and  $T_D$ .

It has been investigated how accurately the rate of evaporation  $h$  might be calculated from Dalton's formula:

$$h = k \cdot O \cdot (P - p) : B, \text{ where}$$

$k$  a coefficient calculated from the value of  $h$ .

$O$  the superficial area.

$P$  the pressure of saturated steam at the drying temperature,

$p$  the vapour pressure in the drying air, and where

$B$  is the air pressure.

( $O : B$  is here a constant, which may be included in the constant coefficient  $k$ , and the formula will then be:  $h = K \cdot (P - p)$ ).

The velocity of air does not enter into Dalton's formula. Without taking into consideration the velocity of air, deviations varying from - 77 % to + 315 % have been found between the values of the rate of evaporation calculated according to Dalton's formula and those found by experiment. By dividing the tests performed into groups in such a manner that each group comprises drying tests with approximately the same velocity of air, and by calculating the rate of evaporation according to Dalton's formula, the deviations between the rates of evaporation calculated in this manner and those determined by experiment were found to vary from - 60 % to + 100 %.

In order to illustrate how the new formula may be used, partly for dimensioning a drying plant of the same nature as the experimental plant and partly for calculation of a drying plant of the same nature and of given dimensions, three examples are worked out fully in the pamphlet.

## French Chemical Notes

(FROM OUR FRENCH CORRESPONDENT.)

THE National Liquid Fuel Committee, founded in 1921 to organise research with a view to the utilisation of alcohol in motor engines, has just been dissolved in consequence of the recent creation of the more comprehensive "National Office of Liquid Fuels." At a final meeting of the Committee, in presence of numerous political and scientific personalities, its President, M. Daniel Berthelot, announced the results of its investigations, which showed that (1) "third" solvents such as butylic alcohol or cyclohexanol rendered the alcohol-petrol mixture homogeneous; (2) the industrial preparation of absolute alcohol was a possibility; (3) a mixture of equal parts of alcohol and petrol presented a stability sufficient to enable it to be utilised by engines of all vehicles, including motor buses, lorries, and tractors; and (4) that the compression rate found in the case of ordinary motor spirit could be considerably exceeded with the alcohol-petrol mixture. From these results, said M. Berthelot, originated the law voted at the beginning of 1923, recommending the utilisation of the mixture mentioned as motor fuel.

At the close of the meeting the medal and first prize were awarded respectively to M. Lorette, promoter of the industrial production of alcohol, and to M. Guinot, noted for his work on the dehydration of alcohol. Medals were also presented to M. Schwartz, engineer, and to the Faculty of Science of Montpellier University for its active share in the committee's work.

### German Competition

In France chemists realise, not without consciousness of the German ability for industrial practice, that Bergius has not merely patented a practical process of artificial petrol production, but has established a permanent plant.

M. Kling, the head of the Paris Municipal Laboratory, recently visited the Mannheim-Rheinau factory, and on his return declared himself greatly impressed. Speaking of the "tube laboratory," which is the most striking feature of the installation, he said that 6 tons of material pass through it hourly. The tube is situated, together with the superheating molten lead baths, in a hall into which no one penetrates because of the danger of accident. The indications of temperature and pressure at every important point of the apparatus, as well as of the quantities of raw materials entering and of products separated, are transmitted to registering instruments which are grouped in the office of the overseer. From this room the various electrical controls are operated. It is probable that Germany is already in a position to weather a famine of natural light liquid fuels by the production of artificial substitutes. The Mannheim-Rheinau factory is fitted with two installations, one of which ensures the daily treatment of 50 tons of heavy tar, asphalt and bitumen oils.

### New Calorimetric Bomb

At a recent meeting of the French Academy of Science a new calorimetric bomb was examined which is to replace the memorable Berthelot bomb, destroyed by an explosion in 1918. It was out of the question to reproduce the latter because of the great weight of platinum that it contained, but M. Moureu, in collaboration with M. Philippe Landrieu, succeeded after numerous experiments in creating a model of sufficient precision, while employing ten times less platinum than Berthelot had used. M. Le Chatelier reminded the Academy that 30 years ago he had proposed to replace the platinum by bitumen of Judea, and that this substitution had been realised with the aid of a vitreous enamel by Mahler, whose bomb is universally employed in industry to-day. Though inapplicable to measures of very high precision, it was much cheaper, and quite adequate for calorimetric measures. At the same meeting of the Academy MM. Colin and Grandsire described the distribution of sugary and saline substances in the different tissues of beetroot tubercles.

### Wembley Chemical Notes

It is early days yet to forecast the effects of Wembley, but the general impression appears to be that results to date are fairly satisfactory, but all would benefit by increased attendances.

Among the exhibits that have so far received but brief reference is that of The South Metropolitan Gas Co., which displays thirty-five samples of metro-chemicals produced by the company in the destructive distillation of British coal. The stand, designed and built by the company, is in the form of four towers separating intermediates, ammonia products, coal tar derivatives, and heavy inorganic products. Each tower is surmounted by a brazier containing smokeless coke fuel. Edwards and Gritton are newcomers in the Chemical Hall for this year's exhibition. On the pharmaceutical side it is being demonstrated that British industry is successfully competing with the continental trader in the matter of packed medicinal products. The medicinal paraffin which Edwards and Gritton are offering their customers is an article in the front rank of pharmaceutical lines. Prepared in this country from Russian petroleum it is guaranteed to be non-clouding and to stand a test of 14° below zero.

#### Price's Patent Candle Co., Ltd.

Because it exhibits working plant Price's stand is sure of attention, but apart from that the artistic arrangement and varied display also command success. The large stand shows the complete process of candle making. The wicks are plaited and the liquid wax poured into the moulding machine. In this particular case the well-known "Trylite" candles are turned out at the rate of nearly 200 a time. The wick is led up through the moulds by wires and by a single stroke the completed candles are forced through the top of the machine ready for disconnection. Every kind of candle, from the ordinary utility type to expensive hand-painted specimens, is on view and self-fitting shapes are popular.

Herbert Green and Co., Ltd. have an interesting exhibit of industrial alcohols, including fusel oil, methylated rosin finish, rectified alcohol, power alcohol, wood naphtha, and molasses, and the exporter will be interested in the exhibit of Heller and Sons, who specialise in every type of trade stencil. H. and T. Kirby and Co., Ltd., show British aspirin tablets, and a running machine turns out 105 completed tablets per minute. J. M. Collett and Co., Ltd., have a good showcase. Bath salts, sodium bisulphate, precipitated gypsum caramel, and "Gippon"—a white sterile glaze—are features. J. B. Wilkinson has a well-arranged display. Sodium bisulphide solution and potassium bisulphide are shown, also a good sample of sodium sulphide (pea crystals), and sulphonated castor oil. Charles Roberts and Co., Ltd., of Wakefield, have a practical display in the form of scale models of their special railway wagons for the transport of chemicals, acids, etc. A specially-designed 12-ton cylindrical tank wagon with wood under-frame for the conveyance of sulphuric acid is shown. The construction of the model is easily examined and the capacity is about 1,500 gallons.

#### Chemists' and Druggists' Sundries

In the chemistry section are to be seen many excellent exhibits showing chemist's requisites. Yardley and Co. are prominent with an artistic showing of all their well-known lines, including a new presentation size in "Old Bond Street" perfume. The stand shows perfumes, powders, smelling salts, shaving soaps, etc., and the value of the products is enhanced by the artistic containers provided. The Erasmic Co. is prominent with its now famous soap bubble fountain, and the stand is well stocked with every toilet requisite imaginable. Hillthorne, Ltd., show perfumes and similar lines and make a feature of "Certus," a cold water glue. Ayres and Draper have soaps, etc., and W. B. Cartwright, Ltd., under the sign "Yong Loo" display chemists' sundries, and the Floragen Co., Ltd., and Silk's Toilet Co. come in the same category.

#### Mechanical Handling

At the present time no phase of industry is more progressive than mechanical methods, and because every improvement tends to increase economy, the latest illustrated booklet from Herbert Morris, Ltd., Loughborough, is interesting. Thirty loads handled for the electrical cost of a penny is the claim of these makers of the Morris Electric hoist-block. All types of tackle are illustrated, including travelling models for work on curved tracks with junctions.

### Chemical Matters in Parliament

#### India's Chemical Imports

Earl Winterton (House of Commons, July 1), in reply to Mr. Hannon, gave the following table showing the total values of chemicals and chemical preparations (excluding chemical manures and medicines) imported into British India during the fiscal years ending March 31, 1922, 1923, and 1924, respectively.

| Countries of Origin.                         | Value.          |                 |                 |
|--|-----------------|-----------------|-----------------|
|  | 1921-22.<br>Rs. | 1922-23.<br>Rs. | 1923-24.<br>Rs. |
| United Kingdom .. ..                         | 1,36,36,796     | 1,38,42,461     | 1,35,32,856     |
| Aden and Dependencies ..                     | 26,489          | 25,696          | 22,929          |
| Mesopotamia .. ..                            | 13,119          | 18,066          | 8,193           |
| Ceylon .. ..                                 | 5,531           | 21,285          | 20,066          |
| Straits Settlements (including Labuan) .. .. | 23,226          | 17,261          | 22,018          |
| Hongkong .. ..                               | 30,482          | 44,805          | 77,186          |
| Kenya Colony .. ..                           | 5,64,595        | 4,89,016        | 3,19,071        |
| Australian Commonwealth ..                   | 58,376          | 28,893          | 18,845          |
| Sweden .. ..                                 | 35,483          | 30,416          | 19,637          |
| Norway .. ..                                 | 1,56,545        | 4,03,364        | 3,24,409        |
| Germany .. ..                                | 22,73,606       | 29,73,689       | 34,55,625       |
| Netherlands .. ..                            | 1,63,419        | 2,71,438        | 2,86,245        |
| Belgium .. ..                                | 1,01,086        | 1,37,158        | 1,22,864        |
| France .. ..                                 | 1,56,672        | 57,825          | 1,16,077        |
| Switzerland .. ..                            | 7,636           | 14,422          | 18,987          |
| Italy .. ..                                  | 4,24,781        | 7,71,809        | 11,88,011       |
| Austria .. ..                                | 3,475           | 17,675          | 63,130          |
| Czechoslovakia .. ..                         | 7,470           | 7,442           | 5,906           |
| Jugo-Slavia .. ..                            | —               | 2,790           | 11,962          |
| China (excluding Hongkong and Macao) .. ..   | 36,412          | 19,015          | 43,645          |
| Japan .. ..                                  | 2,91,793        | 2,08,069        | 1,94,829        |
| U.S.A. .. ..                                 | 10,62,418       | 7,60,720        | 5,96,993        |
| Other Countries .. ..                        | 8,223           | 6,226           | 4,833           |
| Totals .. ..                                 | 1,90,87,633     | 2,01,69,541     | 2,04,74,317     |

#### Foreign Capital in Sugar Beet

Major Sir Harry Barnston (House of Commons, July 1), in reply to Mr. Stephen, said that of the sugar beet factory companies that had obtained the subsidy, 15 directors were British and two foreign.

### Royal Society Exhibit at Wembley

#### Important Apparatus in Science Section

On Wednesday afternoon the Royal Society extended an invitation to a special view of their exhibit in the Government Pavilion at the British Empire Exhibition. The Science Exhibit has been organised by the Royal Society with funds provided through the Department of Overseas Trade.

Exhibitors include Professor Bragg, Sir William Bragg, the National Physical Laboratory, Sir Robert Robertson, Sir Ernest Rutherford, and the Research Laboratory of the General Electric Co., Ltd.

Professor Bragg and Mr. D. R. Hartree are responsible for an instructive model representing the atoms of sodium and chlorine in the relative positions they occupy in a crystal of sodium chloride. This model was made at the Physical Laboratory, Manchester University. Photographs of positive ray spectra, illustrating the positive ray method of chemical analysis, are shown by Sir Joseph Thomson, and Dr. F. W. Aston deals with isotopes and the mass-spectrograph. The N.P.L. is responsible for apparatus showing penetration of metals by Y-rays, transparency of materials to X-rays, and fluorescence by ultra-violet light. Sir William Bragg's exhibit is devoted to the analysis of crystal structure, by X-rays, and an apparatus for measuring the velocity of rapid chemical reactions is seen. Much space is given to various phases of wireless research.

Description in detail of the wide range of apparatus is impossible, but the section should be visited by all interested in science and in its latest applications.

The Fuel Research Board has a section and displays a series of diagrams and specimens of tar and all grades of by-products.

## From Week to Week

COURTAULDS, LTD., have given £200 to the Imperial College of Tropical Agriculture.

AT THE AGE of 65 all Liverpool University professors must vacate their Chairs, according to the decision of the authorities.

FIRE CAUSED extensive damage at the premises of the Britto Firefighter Co., of Hulme. The cause was the overboiling of a vat of naphthalene.

THE INSTITUTION OF CHEMICAL ENGINEERS has just issued the first number of its quarterly bulletin. It surveys the activities of the Institution and reviews the latest additions to the library.

THE DEGREE OF PH.D. has been conferred on Mr. Rae Campbell, M.Sc., of North Shields, by Durham University. Dr. Campbell is engaged on chemical research work at Magdalene College, Oxford, under Professor Parkin.

"ACCIDENTAL DEATH" was the verdict on Arthur Wood, of Chorlton-cum-Medlock, whose death was shown to have been due to lead poisoning. He had been employed by a firm of decorators and had been accustomed to mixing paint with lead.

THE LARGEST FERROCRETE BUILDING yet constructed has just been completed at Battersea. This is a lofty five-storied mill block, covering an area of about 14,000 sq. ft. It was urgently required for factory development, and the use of rapid-hardening cement became essential.

THE PRICE OF NATIONAL BENZOL is to be increased by 2d. per gallon immediately. The price of National Benzol mixture will not be altered immediately, but the benzol content will be slightly reduced, and by this means a continuous supply is assured for several months. The iron and steel trades depression has curtailed production.

JUDGMENT WAS GIVEN last week in an appeal by Andrew Weir and Co. against a decision of Mr. Justice Finlay in favour of the Controller of the Clearing Office, in the matter of certain war-time shipments of Chile nitrate (see THE CHEMICAL AGE, June 20, 1925). Lord Justice Bankes said that the appeal would be allowed with costs.

A GENERAL MEETING of members of the Royal Institution was held on Monday, Sir James Crichton-Browne, treasurer and vice-president, in the chair. The special thanks of the members were returned to the delegacy of the City and Guilds (Engineering) College for their valuable gift of a microphotographic apparatus. Mrs. Romanes and Dr. R. A. Young were elected members.

MR. R. S. PEARSON, C.I.E., F.L.S., Forest Economist, Forest Research Institute, Dehra Dun, India, has been appointed director of Forest Products Research under the Department of Scientific and Industrial Research. Mr. Pearson will be in charge of the Forest Products Research Laboratories in which pure and applied scientific research will be carried on to meet the practical needs of the using industries and of Departments of State.

A NEW CONCRETE MATERIAL, the invention of Lieutenant-Commander Burney, has been named "Facto-Crete." It is claimed for the material that it has the advantages of both wood and concrete. It can be moulded, carved, nailed, and polished. Commander Burney has stated that if Glasgow Corporation is satisfied with the possibilities of "Facto-Crete," he is prepared to consider putting down a factory in the Glasgow area for the production of 3,000 houses a year.

A DINNER in honour of the Ramsay Memorial Fellowship Trustees and of the Ramsay Memorial Fellows was held on Friday, July 3, at University College, London. Professor F. G. Donnan, proposing a toast, said that we should make all our fuel oil from our own coal. Among those who accepted invitations were Sir Robert Hadfield, Professor Collie (chairman of the Advisory Council), Sir Robert Waley-Cohen, Sir William and Lady Bragg, Dr. Walter Seton, Sir Robert Robertson, Professor Carpenter, Professor Donnan, Professor Philip, and Professor Dixon.

THE PUBLIC EXAMINATION of John Duval Bishop and Stanley William Thorp (lately trading together as J. D. Bishop and Co.), late of 22 and 23, Great Tower Street, London, E.C., and formerly carrying on business as chemical and drug merchants, was held at the London Bankruptcy Court last week. Their liabilities amounted to £3,915, of which £3,835 was returned as unsecured and the assets totalled £1,445 net. Bishop formerly acted for some ten years as London representative of a New York company, and in 1907 became their sole agent. In 1916 he began business on his own account as a chemical and drug merchant at 87, Borough High Street, S.E. In December, 1918, he was joined by the debtor Thorp, who introduced into the business stock and cash, and became entitled to a two-fifths share of the profits of the business. They afterwards traded together as J. D. Bishop and Co. In that month in consideration of £2,000 payable in shares they transferred their business to a limited company of the same name, of which they acted as directors. In December, 1921, the company transferred its business to 22 and 23, Great Tower Street, with other premises in Ewer Street, Southwark. The debtors attributed their failure and insolvency to bad debts, to bad trade, and to heavy overhead expenses. The examination was concluded.

SIR JOHN BRUNNER has sent £100 towards the Streatham Common extension scheme.

THE CHLORIDE ELECTRICAL STORAGE CO., LTD., manufacturers of Exide batteries, have established a service depot in Glasgow.

A DRESSING OF CREOSOTE used instead of iron bands to prevent cattle gnawing the bark, is stated to have killed two hundred trees planted by public subscription at Beverley Westwood.

SIR MAX MUSPRATT left Liverpool on Tuesday for a further business trip on the Continent. He is accompanied by Mr. Rudolph Muspratt, and expects to be away for two or three weeks.

THE SILK ADVISORY COMMITTEE for the Lancashire trade will sit in Manchester and consist of thirteen members—three from each of the principal trade organisations concerned, three from the Customs, and one representing the spinners.

DR. R. S. McCANN and Mr. J. E. Bloase have been investigating bauxite deposits in British Guiana on behalf of the British Aluminium Co., Ltd., and associated concerns. If deposits are favourable extensive operations will be opened immediately.

A NEW SYNTHETIC RUBBER is reported to have been produced at the Russian experimental works at Krasny Treugolnik, by Professor B. V. Byzoff. It is reported that he is to go to Baku to inquire into the adaptability of the toluol plants for the production of butadien from which to produce his new material.

RUBBER RESEARCH LABORATORIES have recently been added to the Blackley works of the British Dyestuffs Corporation, Ltd. The laboratories are under the direction of Mr. W. J. S. Naughton, technical manager, and Mr. Cronshaw, works manager, who are pleased to assist manufacturers with tests and research in relative problems.

"THE NOBEL EXHIBIT" is the title of a booklet just issued by Nobel Industries, Ltd., concerning their exhibit at the British Empire Exhibition. In itself it is a complete guide to Section E in the Palace of Industry, and it also contains much information useful to the trader or possible buyer of Nobel products who has not the opportunity of visiting Wembley Park.

GAS AND FUEL PLANTS, LTD., of 40-43, Norfolk Street, Strand, London, inform us that following an inspection of the successful working of the complete gasification of coal plant installed by them at Kilmacoll gasworks, the directors of the Kettle, Streuchie, Kettle-Bridge, and Ladybank Gas Co. have placed an order for a similar plant, capable of producing 50,000 cu. ft. of gas daily.

THE PUBLIC EXAMINATION of William Webb Boulton, of Merryrick Farm, Hanley Castle, took place at Worcester Bankruptcy Court on Tuesday. Liabilities were returned at £521 and the deficiency £182. He had been associated with a glass making business at Stourbridge, and became managing director when it was converted into a limited liability company. Debtor said that the glass making business had been hit by German competition, and he had been bought out at a loss. Further information was asked for by the Registrar.

RECENT TENDERS ACCEPTED INCLUDE—Soap, D. Thom and Co., Pendleton; Tallowie and Co., Ltd., Heywood; paraffin oil, Smith and Forrest, and the Oil Distributors, Ltd.; sheet glass, S. Gratrix, Junr., and Brother, Ltd.; J. G. Nicholls, Ltd., Liverpool; Pilkington Brothers, St. Helens, and Chance Brothers and Co., Ltd., Birmingham; lime, Buxton Lime Firms, Co., Ltd., Buxton; asphalt and bitumen, Bradshaw and Co. (Asphalters), Ltd.; J. Needham and Sons, Ltd.; pitch and creosote oil, Hardman and Holder, Ltd., and T. Horrocks and Sons, Ltd.—all for Manchester authorities. Bio-aeration sewage disposal works, F. A. Whitaker, Leeds (£14,024), for Burley-in-Wharfedale and Menston Sewage Board.

THE FARADAY SOCIETY held its annual general meeting in the lecture theatre of the Chemical Society, Burlington House, Piccadilly, on Monday, Professor F. G. Donnan, the president, being in the chair. The report of the Council, which was adopted, pointed out that during the year 33 new members had been admitted to the society. It was reported that there was an adverse balance of £293 7s. 4d. on the year's work, due in the main to the increased cost of printing the transactions. While loth to diminish the society's activities, the Council had decided to limit the general discussions for the time being to two a year, and it was expected as a result to balance income and expenditure during the present year.

### Obituary

MR. JOHN STEPHEN, of Hull, a director of the British Oil and Cake Mills, Ltd. He had been prominently identified with the Hull seed crushing industry for over 25 years.

MR. GEORGE GRIFFITHS, of West Bromwich, following an injury said to have been sustained while at work at W. H. Keys, Ltd., oil works, West Bromwich. Keys, Ltd., are tar distillers, paint manufacturers, etc.

MR. F. L. CANNON, former works manager to L. Oertling, Ltd., Turnmill Street, E.C.1, on Sunday, from appendicitis and complications. He had been in the service of the firm for over 45 years, and survived three generations of the Oertling family. For several years prior to 1914 he travelled throughout the British Isles, visiting the principal laboratories, and became well known to a large number of works chemists. In 1919 he was appointed works manager, and retired in December, 1924.

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- PHENOLS.—Molecular compounds of phenols. Parts V and VI. G. Weissenberger and F. Schuster. *Monats. für Chem.*, May 27, 1925, pp. 437-455.
- AMMONIA.—On ammonia solutions. F. E. C. Scheffer and H. J. de Wijs. *Rec. Trav. Chim. Pays-Bas*, June, 1925, pp. 655-662.
- REACTIONS.—The action of ammonia on the esters of citraconic, mesaconic and itaconic acid. K. Stosius and E. Philippi. *Monats. für Chem.*, May 27, 1925, pp. 457-470.
- SACCHARIN.—The acidic character of saccharin and related acids; detection and estimation of *p*-sulphaminobenzoic acid in saccharin and crystalline. I. M. Kolthoff. *Rec. Trav. Chim. Pays-Bas*, June, 1925, pp. 629-637.

## Patent Literature

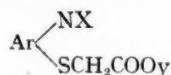
## Abstracts of Complete Specifications

234,864. RECOVERY AND FRACTIONAL SEPARATION OF THE DISTILLATES OF SHALE COAL AND OTHER ORGANIC SUBSTANCES, METHOD AND APPARATUS FOR. A. G. Black, 361, Collins Street, Melbourne, Australia. Application date, January 30, 1924.

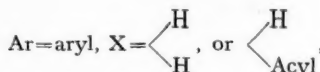
The retort comprises a cylinder slightly inclined downwards, and adapted to receive a perforated cartridge containing the organic matter. At the end of the distillation, the cartridge containing the residue can be removed through the end of the cylinder, which is fitted with a detachable cover. The gases are drawn off in a downward direction into a pipe line containing a filter which retards the heavier gases or vapours and allows the lighter gases to pass to a condenser, and thence to another filter. The heavier vapours which are retarded by the filters are separately drawn off to receiving tanks. The flow of gases from the retort is regulated by steam jets arranged in the annular space between the cartridge and the outer cylinder.

234,928. VAT DYESTUFFS OF THE THIO-INDIGO SERIES, MANUFACTURE OF. A. Carpmael and A. J. Ransford, London. From L. Cassella and Co., G.m.b.H., Frankfurt-on-Main, Germany. Application date, March 12, 1934.

These dyestuffs are produced by treating with an acid condensing agent an *o*-amino-aryl-thioglycolic acid of the general formula

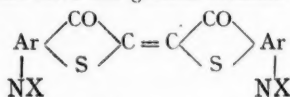


where

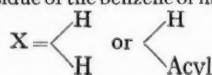


or N-azo-component and  $v = H$  or a metal.

These dyestuffs have the general formula



where Ar is the residue of the benzene or naphthalene nucleus and



or N-azocomponent and in which the S atom of the thioindigo ring stands in the ortho position to NX.

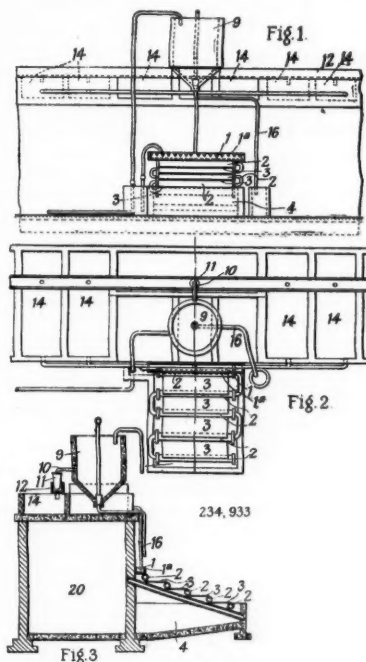
The *o*-amino-aryl-thioglycollic acid may be obtained by condensing the hydrolysed products of reaction of disulphur-dichloride on primary aromatic amines with monochloroacetic acid. The acids are preferably employed in the form of the heavy metal salts, or the acyl compounds may be used. The azo dyestuffs obtained by diazotising the *o*-amino-aryl-thioglycollic acids and coupling them with phenols, naphthols, etc., may also be treated with acid condensing agents.

The condensing agent may be chlorosulphonic acid, with or without concentrated sulphuric acid, sulphuric acid monohydrate, and fuming sulphuric acid. A catalyst such as boric or phosphoric acid may also be present. The condensation may be carried out at a low temperature, so that only the oxythionaphthenes or naphthoxy-penthiophenes are formed containing in their molecule the group NX in ortho-position to the S atom of the thionaphthene or penthiophene ring. These products may then be oxidised to the dyestuffs. A number of examples are given.

234,933. WHITE COMMERCIAL PURE AMMONIUM CHLORIDE, METHOD OF PRODUCING. T. B. Smith, 153, Oxford Road, Linthorpe, Middlesbrough, and Simon-Carves, 20, Mount Street, Manchester. Application date, March 14, 1924.

In this process the corrosion of the steam-heated pipes used in evaporating crude ammonium chloride liquor is avoided. An elongated trough 1 has one edge 1a serrated, and is arranged above a series of cast-iron heating pipes 2, connected in series and having horizontal boards 3 so that chloride liquor passes from the trough 1 over the pipes in cascade. The liquor is

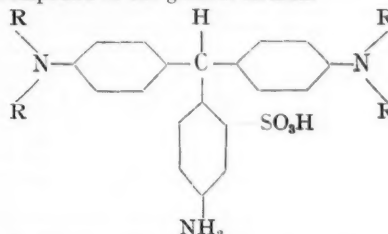
raised from a receiving tank 4 to the trough 1, and passes downwards over the heating pipes back to the tank 4. When the desired strength of solution is attained, the liquor is raised to a tank 9 where it is allowed to settle, and the clear liquid is decanted through a pipe 10 to a filter 11. The filtrate passes



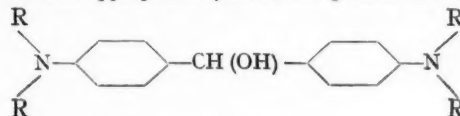
into a trough 12 and thence to a crystallising tank 14. The residue is discharged from the tank 9 through the pipe 16. The crystallised chloride passes to a drier in the space 20. During evaporation, the liquor never rises above 90° C., so that dissociation into ammonia and hydrochloric acid, with consequent corrosion of the pipes, does not occur.

234,950. **TRIPHENYL METHANE-AZO-DYESTUFFS, MANUFACTURE OF.** O. Y. Imray—London. From Soc. of Chemical Industry in Basle, Switzerland. Application date, April 7, 1924.

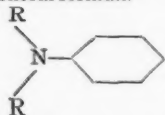
These triphenyl-methane-azo-dyestuffs which are capable of being chromed are obtained by coupling a diazotised triaryl methane compound of the general formula



(in which R represents the same or different alkyl or aralkyl residues) with a 1-aryl-5-pyrazolone derived from an amino-salicylic acid or a homologue or derivative such as an aminocresotinic acid or an amino-sulpho-salicylic acid or a chloro-amino-salicylic acid. The triarylmethane compounds employed may be obtained by condensing a 3-amino-1-benzenesulphonic acid with the appropriate hydrol of the general formula



or by condensing a 2-sulpho-4-nitro-1-benzaldehyde with a tertiary amine of the general formula



and reducing the condensation product. In one example, para-amino-orthosulpho-tetramethyl-para-paradiamino-triphenyl-methane is diazotised and coupled with 1-(4'-oxy-3'-carboxy)-phenyl-3-methyl-5-pyrazolone, yielding an orange-yellow dyestuff. Several other examples are given.

234,956. AZO DYESTUFFS. Soc. of Chemical Industry in Basle, Switzerland, and H. Schobel, 26, Bergalingerstrasse, Basle, Switzerland. Application date, April 16, 1924. Addition to 191,305.

Specification 191,305 describes the production of violet-brown dyestuffs for chrome printing by coupling  $\beta$ -resorcylic acid with diazo compounds derived from 1-amino-2-oxy-naphthalene-4-sulphonic acid. In this invention,  $\beta$ -resorcylic acid is coupled with one or two molecular proportions of the same or different diazo compounds, one at least being an ortho-oxy-diazo-compound of the benzene series. Examples are given of the use of compounds such as the diazo compounds from 4-nitro-2-amino-1-oxybenzene, 1-oxy-2-amino-4-chlorobenzene-5-sulphonic acid, 1-oxy-2-amino-4-nitrobenzene-6-carboxylic acid, and 1-oxy-2-amino-4-sulphobenzene-6-carboxylic acid. The dyestuffs give red to brown solutions, and violet to brown tints by chrome printing.

234,962. DICHLOR-N-DIHYDRO-1:2:2':1'-ANTHRAQUINONE-AZINE, PROCESS OF MAKING. A. Carpmal and R. B. Ransford, London. From L. Cassella and Co., G.m.b.H., Frankfurt-on-Main, Germany. Application date, April 22, 1924.

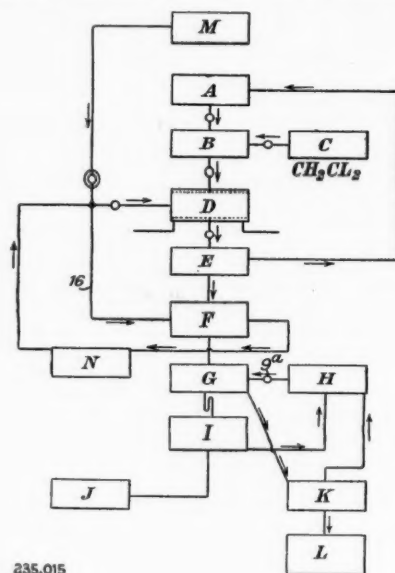
A dichlor derivative of N-dihydro-1:2:2':1'-anthraquinone-azine, which is fast to chlorine and can be dyed in hard water can be obtained by suspending N-dihydro-1:2:2':1'-anthraquinoneazine in molten sulphur above the boiling point of disulphur dichloride, and preferably above 200° C. and passing chlorine through it. The sulphur is subsequently removed by digesting with sodium sulphide, and the green dichlorinated azine is reduced to the blue hydroazine.

235,015. HEXAMETHYLENE-TETRAMINE, MANUFACTURE OF. H. Wade, London. From S. Karpen and Bros., 636, West 22nd Street, Chicago, Ill., U.S.A. Application date, June 24, 1924.

The process is for producing hexamethylene-tetramine by reacting on aqueous ammonia with methylene chloride, a large excess of ammonia being employed. In the reaction between methylene chloride and ammonia, it has been found that (1) The presence of water greatly increases the reaction velocity. (2) The formation of hexamethylene tetramine hydrochloride by hydrolysis can be prevented by employing such an excess of ammonia that hydrochloric acid cannot form. (3) The use of a large excess of aqueous ammonia enables the reaction to proceed more quickly than by using liquid ammonia. (4) The use of alcohol as a solvent for methylene chloride decreases the velocity of the reaction, and is unnecessary when aqueous ammonia is used. It has also been found that the reaction proceeds very slowly at ordinary temperatures, but at a practicable velocity at 100° C. If an excess of 300 per cent. to 400 per cent. of concentrated aqueous ammonia is employed the reaction is complete in 8 to 10 hours.

The storage tank A contains concentrated ammonia saturated with hexamethylene tetramine and ammonium chloride, and the storage tank C contains methylene chloride. Ammonium chloride produced is crystallised in the cooling tank D. The autoclave B discharges into a filter or centrifuge E, and the liquor is returned to the tank A. A drier F receives the solids from the filter E, and an extractor G from the drier F. The solution of hexamethylene tetramine passes from the extractor G to still I, and thence to the tank J. A solvent, e.g., chloroform, is contained in the tank H. Ammonium chloride passes to a drier K and then to a storage tank L. Liquid ammonia is contained in a storage tank M. In operating the system, liquor passes from the tank A to autoclave B, and about 20 per cent. of the equivalent of methylene chloride is admitted from the tank C. After heating for the

requisite time, the liquid passes through the cooler D, and ammonia is admitted through the pipe 15 to crystallise out the hexamethylene tetramine, and restore the stock solution to its original condition, so that it can be returned from the



235,015

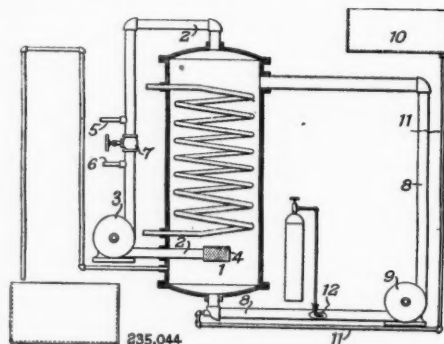
filter E to the tank A. The solvent supplied from the tank H to extractor G is controlled by a valve 9a. Ammonia is passed through the pipe 16 to the drier F to replace that which is driven off in drying.

235,020. SALT, RECOVERY OF. Salzbergwerk Neustassfurt and F. Grotogino, Loderburg, near Stassfurt, Germany. Application date, July 3, 1924.

To obtain edible salt from rock salt, a solution of the salt is mixed with aluminium chloride, zinc chloride or potassium chloride, and calcium or magnesium chloride, and the salt then crystallised out.

235,044. CONCENTRATED CHLORHYDRIN SOLUTIONS, PROCESS OF MAKING. E. C. R. Marks, London. From Carbide and Carbon Chemicals Corporation, 30, East 42nd Street, New York. Application date, August 13, 1924.

Concentrated solutions of chlorhydrin are obtained by the action of an olefine on a solution of hypochlorous acid, the latter being produced continuously by the action of chlorine



caustic soda is fed from a tank 10 through pipe 11 to pipe 8 in such amount that the concentration of NaOH in the liquid is less than 1 per cent., and the equivalent amount of chlorine is then introduced at 12. The alkalinity is neutralised by chlorine so quickly that hydrolysis of the chlorhydrin does not take place. The use of a 6 per cent. solution of caustic soda yields a 10.5 per cent. solution of ethylene chlorhydrin, which can be concentrated and purified as desired.

NOTE.—Abstracts of the following specifications which are now accepted, appeared in THE CHEMICAL AGE when they became open to inspection under the International Convention:—211,125 (F. Gros) relating to production of hydrogen and acetylene from methane or ethylene or gases containing such hydrocarbons, see Vol. X, p. 391; 211,454 and 217,172 (Ricard Allenet and Cie) relating to manufacture of absolute alcohol, see Vol. X, p. 446 and Vol. XI, p. 148; 214,205 (E. L. Ford) relating to manufacture of puddled iron, see Vol. XI, p. 7 (Metallurgical Section); 215,734 (A. Wittig) relating to production of vanadium, see Vol. XI, p. 15 (Metallurgical Section); 216,838 (Farbenfabriken vorm. F. Bayer and Co.) relating to dyeing of acidyl celluloses, see Vol. XI, p. 124; 217,554 (C. B. Wisner) relating to production of hydrocarbons from fuel, see Vol. XI, p. 174; 219,322 (J. Tausz) relating to purification of hydrocarbon oils, see Vol. XI, p. 299; 223,918 (Deutsche Gold and Silber Scheideanstalt vorm. Roessler) relating to manufacture of hydrogen cyanide, see Vol. XII, p. 13; 223,572 (Soc. d'Etude des Agglomerates) relating to production of pure zirconium oxide, see Vol. XI, p. 668; 229,298 (H. Suida) relating to manufacture of ethyl chloride, see Vol. XII, p. 414.

#### International Specifications not yet Accepted

233,367. NITROCELLULOSE EMULSIONS. T. Whittelsey, Ringoes, N.J., U.S.A. International Convention date, November 6, 1922.

A solution of pyroxylin in amyl acetate is shaken with water containing sodium oleate to obtain an emulsion. Reference is directed to specification 24289/03.

233,649. POLYMERIZED STYROLENE AND ITS HOMOLOGUES. Naugatuck Chemical Co., Elm Street, Naugatuck, Conn., U.S.A. (Assignees of I. Ostromislensky, and W. A. Gibbons, 561, West 58th Street, New York, and M. G. Shepard, 851, West End Avenue, New York. International Convention date, May 7, 1924.

Mixtures containing styrolene are obtained by decomposition of ethyl benzol, xylol, etc., or by cracking petroleum oils, or by collecting fractions boiling at 130°-160° C. obtained in distilling waste products produced in carburetting water gas. The mixture is polymerized by heating to 140°-180° C. in an autoclave for 16-24 hours. The resinous product is purified by steam treatment, and depolymerized by distilling at 350°-500° C. The styrolene distilled is diluted with xylol, and polymerized again by heating to 135°-140° C. A vitreous product is obtained by evaporation, and a description is given of various modifications produced by mixtures with other materials.

#### LATEST NOTIFICATIONS.

236,145. Process for the catalytic combustion of explosive gaseous mixtures. Dr. I. W. Cederberg. June 24, 1924.

236,146. Manufacture of barbituric acid derivatives. J. D. Riedel Akt.-Ges. June 28, 1924.

236,158. Process for the manufacture of certain albumins and fatty matters. M. Kahn. June 25, 1924.

236,209. Manufacture of a stable degreasing-agent. G. Zimmerli Chemisch-Technische Fabrik. June 27, 1924.

236,211. Manufacture of artificial silk. Dr. M. Hölken. June 24, 1924.

236,218. Moth-proofing composition. Larvex Corporation. June 24, 1924.

236,230. Process of hydrogenating tar oils. Dr. W. Demann. June 30, 1924.

#### Specifications Accepted with Date of Application

213,251. Farnesol, Process for the manufacture of. M. Naef and Co. March 22, 1923.

213,285. Soluble antimony compounds, Process for the manufacture of. Chemische Fabrik von Heyden Akt.-Ges. March 24, 1923.

213,567. Urea or its derivatives and formaldehyde, Manufacture of condensation products from. F. Pollak. March 31, 1923.

213,599. Inorganic and organic acids, Process of producing. A. F. Mayerhofer. March 27, 1924.

214,237. Arsenobenzene compounds, Manufacture of complex metallic. Farbwerke vorm. Meister, Lucius, and Brüning. April 9, 1923.

219,667. Zinc from zinc oxide compounds, Process for the extraction of. C. J. G. Aarts. July 28, 1923.

220,320. Rubber and similar substances, Processes for retarding the deterioration through oxidation of. Naugatuck Chemical Co. August 8, 1923.

222,838. Alkali salts, Process of decomposing—into hydroxides or carbonates and acids. A. F. Mayerhofer. October 1, 1923.

223,919. Ammonia and ammonia compounds, Process for the manufacture of—from cyanamides. Fabrique Nationale de Produits Chimiques et d'Explosifs Anciens, Etablissement Chinigonet et Delattre Soc. Anon. October 23, 1923.

226,783. Separating krypton and xenon from the atmosphere, Process for. Soc. Anon. d'Eclairage et d'Applications Electriques. December 26, 1923.

227,820. Electrodes for electric furnaces. Norske Aktieselskab for Elektro-Kemisk Industri Norsk Industri-Hypotekbank. January 17, 1924.

235,666. Reducing ores and producing cement, Processes and apparatus for. A. Ferguson. December 19, 1923.

235,613. Sulphate of ammonia, Manufacture of. Chemical Engineering and Wilton's Patent Furnace Co., Ltd., T. O. Wilton and N. Wilton. February 20, 1924.

235,641. Metalliferous materials, particularly oxidised copper compounds. Smelting of. J. C. Hoal and Metals Production, Ltd. March 19, 1924.

235,698. Nitrated organic compounds, J. B. Menke. May 23, 1924.

235,727. Acetyl cellulose, Method of recovering acetic acid in high percentage form from acetic solutions of. Vereinigte Glanzstoff-Fabriken Akt.-Ges., and F. Paschke. July 3, 1924.

#### Applications for Patents

Ashcroft, E. A. Plants for treating ores, etc. 16,916. July 1.

Ashcroft, E. A. Treatment of sulphide ores, etc. 16,917. July 1.

Barnard, C. M. and British Alizarine Co., Ltd. Dyeing cellulose-ester artificial silks, and manufacture of dyestuffs therefor. 17,188, 17,189. July 4.

British Cyanides Co., Ltd. and Rossiter, E. C. Manufacture of articles from synthetic resins. 16,955. July 1.

British Dyestuffs Corporation, Ltd. and Naunton, W. J. S. Manufacture of diarylguanidines. 17,251. July 4.

Brysilka, Ltd. and Schubert, F. W. Manufacture of artificial silk. 16,968, 16,969, 16,970, 16,971, 16,972, 16,973. July 2.

Carpmael, W. and Farbenfabriken vorm. F. Bayer and Co. Manufacture of  $\mu$ -amino-alkylaminonaphthalene compounds, etc. and of dyestuffs therefrom. 16,724. June 29.

Chemische Fabrik auf Actien vorm. E. Schering. Manufacture of ureas. 16,957. July 1. (Germany, July 2, '24.)

Chemische Fabrik Griesheim-Elektron. Charging carbon-disulphide furnaces. 17,074. July 2. (Germany, July 3, '24.)

Cotes, H. J. and Duncalfe, R. Extraction of gelatine and glue from skins, bones, etc. 17,162. July 3.

Coty Soc. Anon. Extraction of colouring-matter from henna leaves. 16,838. June 30. (France, July 2, '24.)

Cronshaw, C. J. T. Manufacture of diarylguanidines. 17,251. July 4.

Dreyfus, H. Manufacture of cellulose derivatives. 16,914. July 1.

Dreyfus, H. Production of organic compounds. 16,915. July 1.

Hunter, J. and McGougan, J. Emulsifying apparatus. 17,206. July 4.

Kirkham, A., Spence, H., and P. Spence and Sons, Ltd. Manufacture of titanium compounds. 16,874. July 1.

Köln-Rottweil Akt.-Ges. Manufacture of oxidation products of siccative oils. 17,071. July 2. (Germany, August 11, '24.)

May and Baker, Ltd. and Stickings, R. W. E. Preparation of soluble salts of substituted phenylarsinic and phenylstibinic acids. 16,948. July 1.

Naamlooze Vennootschap Fabriek van Chemische Producten and Ter Horst, A. Manufacture of cellulose formate, etc. 16,817. June 30.

Taubmans, Ltd. Treatment of wood oil for varnishes, etc. 16,932. July 1. (Australia, July 10, '24.)

Trumble, M. J. Distillation of carbonaceous materials. 16,712. June 20.

Ward, H. H. Carbons for recovery of benzol from gas, etc. 17,122. July 3.

#### British Drug Houses, Ltd.

A CATALOGUE of chemical products has just been issued by the British Drug Houses, Ltd., Graham Street, City Road, London, N.1. The greater part is devoted to organic and inorganic chemicals for research and analysis, the products being listed in alphabetical order for ready reference. Sections are also included on indicators, stains, etc., and there is a list of aniline dyes for technical purposes.

## London Chemical Market

The following notes on the London Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, July 9, 1925.

BUSINESS has been moderately active during the week, but orders still continue to be for relatively small quantities.

Prices on the whole continue steady and stocks of many products are light.

Export demand continues unsatisfactory and featureless.

### General Chemicals

ACETONE stocks continue light, and for what little business there is passing, the price of £75 to £76 per ton is quoted.

ACID ACETIC is moderately active, and to-day's value is £38 per ton for 80% technical, and £39 per ton for 80% pure.

ACID CITRIC continues quiet with price nominally 1s. 5d. per lb.

ACID FORMIC is in fair request at £48 to £49 per ton for 85%.

ACID LACTIC is fairly well called for and the price is very firm at £43 per ton for 50% by weight.

ACID OXALIC continues quiet and is quoted at 3½d. per lb.

ACID TARTARIC remains weak, and supplies are available at from 11d. to 11½d. per lb.

ALUMINA SULPHATE.—In moderate demand; 17/18% is quoted at £6 2s. 6d. to £6 7s. 6d. per ton, ex warehouse.

ARSENIC is as dull as ever, and the nominal value is £24 10s. to £25 per ton.

BARIUM CHLORIDE has been active, but the price is easy at £9 10s. per ton.

CREAM OF TARTAR.—A fair business is reported, and the material is fairly firm at £75 to £78 per ton.

EPSOM SALTS.—Unchanged.

FORMALDEHYDE continues very quiet and the price still moves in the downward direction, and is at present standing at about £40 per ton.

LEAD ACETATE continues in very active request, and the present price is quoted at £44 10s. for white and £42 10s. per ton for brown.

LIME ACETATE continues firm, and grey is quoted at £15 10s. per ton and brown about £10 10s. per ton.

METHYL ALCOHOL is lifeless, and the nominal quotation is about £48 per ton, c.i.f.

POTASSIUM CAUSTIC is weak at about £29 to £30 per ton for 88-92%.

POTASSIUM CHLORATE continues scarce, with price round about 4½d. per lb. for spot.

POTASSIUM PERMANGANATE is in very small request at about 7½d. per lb.

POTASSIUM PRUSSIAN continues extremely firm at 7½d. per lb. for spot delivery.

SODIUM ACETATE has been in somewhat better request, and the price is now nominally standing at from £18 to £19 per ton.

SODIUM BICHROMATE continues in fair request at English makers' prices.

SODIUM HYPOSULPHITE is without change in price, but business is still very poor for commercial quality.

SODIUM PRUSSIAN is quite active and price is firm at 4½d. to 4¾d. per lb.

SODIUM NITRITE is fairly active and price is unchanged at £23 per ton.

SODIUM SULPHIDE.—Unchanged.

### Coal Tar Products

The general tone of the market for coal tar products remains quiet.

BENZOL 90% is steady at 1s. 8d. to 1s. 9d. per gallon on rails.

There is a rumour of an increase in the price of the National Benzol Association's benzol, but as the buying outside of this Association is by no means active, it is improbable that the price of benzol in the open market will be materially affected, should this rise take place.

PURE BENZOL is quoted at 1s. 10d. to 1s. 11d. per gallon on rails.

CREOSOTE OIL is no more than steady at 5½d. per gallon on rails in the North, while the price in London is from 7d. to 7½d. per gallon.

CRESYLIC ACID remains in poor demand, and is valued at 1s. 7d. to 1s. 8d. per gallon on rails in bulk for the pale quality 97/99%, while the dark quality 95/97% is quoted at 1s. 5d. per gallon on rails.

SOLVENT NAPHTHA is firm at 1s. 3d. to 1s. 4d. per gallon on rails.

HEAVY NAPHTHA is quoted at 1s. to 1s. 1d. per gallon rails.

NAPHTHALENES are unchanged, the lower grades being worth from £3 to £3 15s. per ton, while the 74/76 quality is quoted at £5 to £5 10s. per ton, and the 76/78 quality at £5 15s. to £6 per ton.

PITCH.—There are no new features to report.

### Latest Oil Prices

LONDON :—LINSEED OIL was irregular; spot, £41; July-Aug., £39 15s., after £40 had been paid; Sept., £39 15s. paid. RAPE OIL was unchanged. Crude, crushed, £50; refined, £53. COTTON OIL was steady. Refined common edible, £47; Egyptian, crude, £42 10s.; deodorised, £49. TURPENTINE.—American was easier. Spot, 67s., sellers; July-Dec., 67s. 9d. per cwt. No business was reported.

HULL :—LINSEED OIL.—Naked, spot, £40; July to Sept.-Dec., £39 17s. 6d. COTTON OIL.—Naked Bombay crude, £38; Egyptian crude, £42; edible refined, £45 15s.; deodorised, £47 15s.; technical, £41. PALM KERNEL OIL.—Crushed naked 5½ per cent., £42. GROUNDNUT OIL.—Crushed-extracted, £48; deodorised, £52. SOYA OIL.—Extracted and crushed, £41; deodorised, £45. RAPE OIL.—Extracted, £48 per ton net cash, ex mill. COD OIL and CASTOR OIL.—Unchanged.

### Nitrogen Products Market

Export.—During the last week the export demand has continued steadily and sales have been made to the Continent, the Far East, and the West Indies. The sales have been made on the basis of £12 2s. 6d. per ton in double bags, and £11 10s. per ton in single bags f.o.b. U.K. port. The substantial quantities sold for summer delivery should enable the producers to carry out their policy of raising prices as the season advances.

Home demand.—The home demand is quiet; prices are unchanged.

Nitrate of Soda.—The Nitrate market continues firm; cargoes c.i.f. chief European ports are changing hands at about £11 14s. per ton. It is anticipated that the directorate will have no difficulty in disposing of their summer production at around this figure. The stocks in Europe and Egypt are not sufficient to embarrass the nitrate producers, though liquidation would tend to make the market firmer.

### American Market Movements

(From Drug and Chemical Markets.)

INDUSTRIAL chemical prices show but slight changes. Copper sulphate is firmer. Arsenic is easy and quiet. Prices on the entire list of imported and domestic products are firm.

Fine chemicals are moving in small volume but in a constant flow which brings total volumes at the end of the month to normal figures. Market is steady with prices well established.

Intermediates continue in slight request with makers maintaining firm unchanged prices on all products. Light oil distillates are in very active demand and prices are very firm. Pyridine has declined.

Prices on vegetable and animal oils continue to advance. Cottonseed oil higher on sharp upward turn in lard. China-wood oil up again. Linseed oil declines. Consuming demand small.

## Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at retailers' works.

### General Heavy Chemicals

Acid Acetic, 40% Tech.—£21 to £23 per ton.  
 Acid Boric, Commercial.—Crystal, £40 per ton, Powder, £42 per ton.  
 Acid Hydrochloric.—3s. 9d. to 6s. per carboy d/d., according to purity, strength and locality.  
 Acid Nitric, 80° Tw.—£21 10s. to £27 per ton, makers' works, according to district and quality.  
 Acid Sulphuric.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations: 140° Tw., Crude Acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.  
 Ammonia Alkali.—£6 15s. per ton f.o.r. Special terms for contracts.  
 Bleaching Powder.—Spot, £10 10s. d/d; Contract, £10 d/d. 4 ton lots.  
 Bisulphite of Lime.—£7 10s. per ton, packages extra, returnable.  
 Borax, Commercial.—Crystal, £25 per ton. Powder, £26 per ton. (Packed in 2-cwt. bags, carriage paid any station in Great Britain.)  
 Calcium Chlorate (Solid).—£5 12s. 6d. to £5 17s. 6d. per ton d/d, carriage paid.  
 Copper Sulphate.—£25 to £25 10s. per ton.  
 Methylated Spirit 64 O.P.—Industrial, 2s. 5d. to 2s. 11d. per gall. Mineralised, 3s. 8d. to 4s. per gall., in each case according to quantity.  
 Nickel Sulphate.—£38 per ton d/d.  
 Nickel Ammonia Sulphate.—£38 per ton d/d.  
 Potash Caustic.—£30 to £33 per ton.  
 Potassium Bichromate.—5d. per lb.  
 Potassium Chlorate.—38d. per lb., ex wharf, London, in cwt. kegs.  
 Sal ammoniac.—£45 to £50 per ton d/d. Chloride of ammonia, £37 to £45 per ton. Carr. pd.  
 Salt Cake.—£3 15s. to £4 per ton d/d. In bulk.  
 Soda Caustic, Solid.—Spot lots delivered, £15 12s. 6d. to £18 per ton, according to strength; 20s. less for contracts.  
 Soda Crystals.—£5 to £5 5s. per ton ex railway depots or ports.  
 Sodium Acetate 97/98%.—£24 per ton.  
 Sodium Bicarbonate.—£10 10s. per ton, carr. paid.  
 Sodium Bichromate.—4d. per lb.  
 Sodium Bisulphite Powder 60/62%.—£17 per ton for home market, 1-cwt. iron drums included.  
 Sodium Chlorate.—3d. per lb.  
 Sodium Nitrate refined 96%.—£13 5s. to £13 10s. per ton, ex Liverpool.  
 Sodium Nitrite 100% basis.—£27 per ton d/d.  
 Sodium Phosphate, £14 per ton, f.o.r. London, casks free.  
 Sodium Sulphate (Glauber Salts).—£3 12s. 6d. per ton.  
 Sodium Sulphide conc. solid. 60/65.—£15 per ton d/d. Contract £14 15s. Carr. pd.  
 Sodium Sulphide Crystals.—£9 5s. per ton d/d. Contract £9 2s. 6d. Carr. pd.  
 Sodium Sulphite, Pea Crystals.—£14 per ton f.o.r. London, 1-cwt. kegs included.

### Coal Tar Products

Acid Carbollic Crystals.—4d. to 4½d. per lb., according to quantity. Quiet demand. Crude 60's, 1s. 4d. to 1s. 5d. per gall. Little business.  
 Acid Cresylic 97/99.—1s. 6d. to 1s. 7d. per gall. Little demand. Pale, 95%, 1s. 5d. per gall. Dark, 1s. 6d. to 1s. 9d. per gall. Slightly better demand.  
 Anthracene Paste 40%.—3d. per unit per cwt.—Nominal price. No business.  
 Anthracene Oil, Strained.—7d. to 8d. per gall. Unstrained, 6d. to 7d. per gall.  
 Benzol.—Crude 65's.—8d. to 9d. per gall., ex works in tank wagons. Standard Motor, 1s. 7½d. to 1s. 8½d. per gall., ex works in tank wagons. Pure, 1s. 11d. to 2s. per gall., ex works in tank wagons.  
 Toluol.—90%, 1s. 7d. to 1s. 9d. per gall. More inquiry. Pure, 1s. 11d. to 2s. per gall. Quiet.  
 Xylol Commercial.—2s. 3d. per gall. Pure, 3s. 3d. per gall.  
 Creosote.—Cresylic, 20/24%, 8d. per gall. Standard specification, middle oil, heavy, 6d. to 6½d. per gall. Fair business.  
 Naphtha.—Crude, 8d. to 9d. per gall. Solvent 90/160, 1s. 5d. to 1s. 8d. per gall. Demand good. Solvent 90/190, 1s. to 1s. 4d. per gall. Fair demand.  
 Naphthalene Crude.—Drained Creosote Salts, £3 to £5 per ton. Market quiet. Whizzed or hot pressed, £6 to £9 per ton.  
 Naphthalene.—Crystals and Flaked, £10 to £11 per ton, according to districts. Very quiet.  
 Pitch.—Medium soft, 35s. to 42s. per ton, according to district. No business until next season. Price nominal.  
 Pyridine.—90/160, 19s. per gall. Heavy, 11s. 6d. to 12s. per gall. Fair business.

### Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated.

Acetic Anhydride 95%.—1s. 7d. per lb.  
 Acid H.—3s. 9d. per lb. 100% basis d/d.  
 Acid Naphthionic.—2s. 2d. per lb. 100% basis d/d.  
 Acid Neville and Winther.—5s. 8d. per lb. 100% basis d/d.  
 Acid Salicylic, technical.—11d. to 11½d. per lb. Steady demand.  
 Acid Sulphanilic.—9d. per lb. 100% basis d/d.  
 Aluminium Chloride, anhydrous.—10d. per lb. d/d.  
 Aniline Oil.—7½d. per lb. naked at works.  
 Aniline Salts.—8d. per lb. naked at works.  
 Antimony Pentachloride.—1s. per lb. d/d.  
 Benzidine Base.—3s. 8d. per lb. 100% basis d/d.  
 Benzyl Chloride 95%.—1s. 1d. per lb.  
 p-Chlorophenol.—4s. 3d. per lb. d/d.  
 p-Chloraniline.—3s. per lb. 100% basis.  
 o-Cresol 29/31° C.—3d. per lb. Demand quiet.  
 m-Cresol 98/100%.—2s. 1d. per lb. Demand moderate.  
 p-Cresol 32/34° C.—2s. 1d. per lb. Demand moderate.  
 Dichloraniline.—2s. 3d. per lb.  
 Dichloraniline S. Acid.—2s. 3d. per lb. 100% basis.  
 Diethylaniline.—4s. 3d. per lb. d/d., packages extra, returnable.  
 Dimethylaniline.—2s. 2d. per lb. d/d. Drums extra.  
 Dinitrobenzene.—9d. per lb. naked at works.  
 Dinitrochlorbenzol.—£84 10s. per ton d/d.  
 Dinitrotoluene.—48/50° C. 8d. to 9d. per lb. naked at works. 66/68° C. 1s. per lb. naked at works.  
 Diphenylaniline.—2s. 10d. per lb. d/d.  
 G. Salt.—2s. 2d. per lb. 100% basis d/d.  
 a-Naphthol.—2s. 3d. per lb. d/d.  
 B-Naphthol.—1s. per lb. d/d.  
 a-Naphthylamine.—rs. 3½d. per lb. d/d.  
 B-Naphthylamine.—3s. 9d. per lb. d/d.  
 m-Nitraniline.—4s. 2d. per lb. d/d.  
 p-Nitraniline.—2s. 2d. per lb. d/d.  
 Nitrobenzene.—5½d. to 5½d. per lb. naked at works.  
 o-Nitrochlorbenzol.—2s. 3d. per lb. 100% basis d/d.  
 Nitronaphthalene.—10d. per lb. d/d.  
 p-Nitrophenol.—1s. 9d. per lb. 100% basis d/d.  
 p-Nitro-o-amido-phenol.—4s. 6d. per lb. 100% basis.  
 m-Phenylene Diamine.—4s. per lb. d/d.  
 p-Phenylene Diamine.—9s. 9d. per lb. 100% basis d/d.  
 R. Salt.—2s. 4d. per lb. 100% basis d/d.  
 Sodium Naphthionate.—2s. 2d. per lb. 100% basis d/d.  
 o-Toluidine.—10d. per lb.  
 p-Toluidine.—2s. 3d. per lb. naked at works.  
 m-Toluyene Diamine.—4s. per lb. d/d.

### Wood Distillation Products

Acetate of Lime.—Brown £9 10s. to £10. Quiet market. Grey £15 per ton. Liquor, 9d. per gall. 32° Tw.  
 Acetone.—£73 per ton.  
 Charcoal.—£7 5s. to £8 10s. per ton, according to grade and locality.  
 Iron Liquor.—1s. 7d. per gall. 32° Tw. 1s. 2d. per gall. 24° Tw.  
 Red Liquor.—10d. to 1s. per gall. 14/15° Tw.  
 Wood Creosote.—2s. 9d. per gall. Unrefined.  
 Wood Naphtha, Miscible.—4s. 3d. per gall.  
 60% O.P. Solvent, 4s. 6d. per gall. 40% O.P.  
 Wood Tar.—£4 per ton.  
 Brown Sugar of Lead.—£43 per ton.

### Rubber Chemicals

Antimony Sulphide.—Golden, 7½d. to 1s. 5d. per lb., according to quality. Crimson, 1s. 5d. to 1s. 7½d. per lb., according to quality.  
 Arsenic Sulphide, Yellow.—2s. per lb.  
 Barytes.—£3 10s. to £6 15s. per ton, according to quality.  
 Cadmium Sulphide.—4s. 4d. per lb.  
 Carbon Bisulphide.—£32 to £35 per ton, according to quantity.  
 Carbon Black.—6d. to 6½d. per lb., ex wharf.  
 Carbon Tetrachloride.—£62 to £67 per ton, according to quantity, drums extra.  
 Chromium Oxide, Green.—1s. 4d. per lb.  
 Indiarubber Substitutes, White and Dark.—5½d. to 7½d. per lb.  
 Lamp Black.—£48 per ton, barrels free.  
 Lead Hyposulphite.—9d. per lb.  
 Lithopone, 30%.—£22 10s. per ton.  
 Mineral Rubber "Rubpron."—£13 12s. 6d. per ton f.o.r. London.  
 Sulphur.—£10 to £12 per ton, according to quality.  
 Sulphur Chloride.—4d. per lb., carboys extra.  
 Sulphur Precip. B.P.—£56 to £65 per ton.

Thiocarbamide.—2s. 6d. per lb.  
Vermilion, Pale or Deep.—5s. 6d. per lb.  
Zinc Sulphide.—1s. 1d. per lb.

### Pharmaceutical and Photographic Chemicals

Acid, Acetic 80% B.P.—£40 per ton ex wharf London in glass containers.  
Acid, Acetyl Salicylic.—2s. 8d. to 2s. 10d. per lb. British makers meeting foreign competition in quality and price.  
Acid, Benzoic B.P.—2s. to 2s. 3d. per lb., according to quantity.  
Acid, Boric B.P.—Crystal £46 per ton, Powder £50 per ton. Carriage paid any station in Great Britain.  
Acid, Camphoric.—19s. to 21s. per lb.  
Acid, Citric.—1s. 5d. per lb., less 5% for ton lots. Raw material dearer.  
Acid, Gallic.—2s. 9d. per lb. for pure crystal, in cwt. lots.  
Acid, Pyrogallol, Crystals.—6s. per lb. for 1 cwt. lots. 7s. 6d. per lb. for 7-lb. lots, according to quantity.  
Acid, Salicylic.—1s. 3d. to 1s. 8d. per lb., according to quantity. Good demand.  
Acid, Tannic B.P.—2s. 9d. per lb.  
Acid, Tartaric.—11½d. per lb., less 5%.  
Amidol.—9s. per lb., d/d.  
Acetanilide.—1s. 7d. per lb. for quantities.  
Amidopyrin.—13s. 9d. per lb.  
Ammonium Benzoate.—3s. 3d. to 3s. 6d. per lb., according to quantity.  
Ammonium Carbonate B.P.—£37 per ton. Powder, £39 per ton in 5 cwt. casks.  
Atropine Sulphate.—12s. 6d. per oz. for English make.  
Barbitone.—11s. 6d. per lb.  
Benzonaphthol.—3s. 5d. to 4s. per lb. spot.  
Bismuth Carbonate.—12s. 9d. to 14s. 9d. per lb. } Prices advanced.  
Bismuth Citrate.—11s. 4d. to 13s. 4d. per lb. } Supplies of the  
Bismuth Salicylate.—10s. 2d. to 12s. 2d. per lb. } metal are still re-  
Bismuth Subnitrate.—10s. 9d. to 12s. 9d. per lb. } stricted.  
according to quantity.  
Borax B.P.—Crystal £29, Powder £30 per ton. Carriage paid any station in Great Britain.  
Bromides.—Potassium, 1s. 11d. to 2s. 1d. per lb.; sodium, 2s. 1d. to 2s. 2d. per lb.; ammonium, 2s. 4d. to 2s. 6d. per lb., all spot. British or Imported.  
Calcium Lactate.—1s. 6½d. to 1s. 8d., according to quantity.  
Chloral Hydrate.—3s. 6d. per lb., duty paid.  
Chloroform.—2s. 5½d. to 2s. 7½d. per lb., less 2½% according to quantity.  
Creosote Carbonate.—6s. 9d. per lb.  
Formaldehyde.—£40 per ton, in barrels ex wharf.  
Glycerophosphates.—Fair business passing. Calcium, soluble and citrate free, 7s. per lb.; iron, 8s. 9d. per lb.; magnesium, 9s. per lb.; potassium, 50%, 3s. 6d. per lb.; sodium, 60%, 2s. 6d. per lb.  
Guaiacol Carbonate.—7s. to 7s. 3d. per lb.  
Hexamine.—2s. 5d. to 2s. 6d. per lb. for cwt. lots.  
Homatropine Hydrobromide.—30s. per oz.  
Hydrastine Hydrochloride.—English make offered at 120s. per oz.  
Hydrogen Peroxide (12 vols.).—1s. 8d. per gallon f.o.r. makers' works, naked.  
Hydroquinone.—4s. 3d. per lb. Nominal.  
Hypophosphites.—Calcium, 3s. 6d. per lb., for 28 lb. lots; potassium, 4s. 1d. per lb.; sodium, 4s. per lb.  
Iron Ammonium Citrate B.P.—1s. 9d. to 2s. 1d. per lb. Green, 2s. 4d. to 2s. 9d. per lb. U.S.P., 1s. 8d. to 2s. per lb.  
Magnesium Carbonate.—Light Commercial, £34 per ton net. Light pure, £46 per ton.  
Magnesium Oxide.—Light Commercial, £70 per ton, less 2½%, price reduced; Heavy Commercial, reduced to £24 per ton, less 2½%; Heavy Pure, 2s. to 2s. 3d. per lb., according to quantity.  
Menthol.—A.B.R. recrystallised B.P., 44s. per lb.; July delivery. Synthetic, 22s. 6d. to 27s. 6d. per lb., according to quality. English make.  
Mercurials.—Red oxide, 5s. 2d. to 5s. 4d. per lb.; Corrosive sublimate, 3s. 7d. to 3s. 9d. per lb.; white precipitate, 4s. 6d. to 4s. 8d. per lb.; Calomel, 3s. 10d. to 4s. per lb.  
Methyl Salicylate.—1s. 8d. per lb.  
Methyl Sulphonol.—18s. to 18s. 6d. per lb.  
Metol.—11s. per lb. British make.  
Paraformaldehyde.—2s. for B.P. quality.  
Paraldehyde.—1s. 4d. per lb., in free bottles and cases.  
Phenacetin.—4s. 3d. per lb. in cwt. lots. Slightly cheaper.  
Phenazone.—6s. 3d. per lb.  
Phenolphthalein.—4s. 3d. to 4s. 6d. per lb. for cwt. lots.  
Potassium Bitartrate 99/100% (Cream of Tartar).—83s. per cwt., less 2½% for ton lots.  
Potassium Citrate.—1s. 10d. to 2s. 2d. per lb.  
Potassium Ferricyanide.—1s. 9d. per lb. Quiet.  
Potassium Iodide.—16s. 8d. to 16s. 11d. per lb., according to quantity. Steady market.  
Potassium Metabisulphite.—7½d. per lb., 1-cwt. kegs included, f.o.r. London.

Potassium Permanganate.—B.P. crystals, 7½d. per lb. spot.  
Quinine Sulphate.—2s. 3d. to 2s. 4d. per oz., in 100 oz. tins. Steady market.  
Resorcin.—4s. 5d. per lb. In fair quantities.  
Saccharin.—63s. per lb. in 50 lb. lots.  
Salol.—3s. 6d. per lb., for cwt. lots.  
Silver Proteinate.—12s. per lb. for satisfactory product light in colour.  
Sodium Benzoate, B.P.—1s. 10d. to 2s. 2d. per lb.  
Sodium Citrate, B.P.C., 1911.—1s. 7d. to 1s. 11d. per lb., according to quantity. U.S.P. 1s. 10d. to 2s. 2d. per lb.  
Sodium Hyposulphite, Photographic.—£14 to £15 per ton, according to quantity, d/d consignee's station in 1-cwt. kegs.  
Sodium Metabisulphite Crystals.—37s. 6d. to 60s. per cwt., net cash, according to quantity.  
Sodium Nitroprusside.—16s. per lb.  
Sodium Potassium Tartrate (Rochelle Salt).—75s. per cwt., for ton lots and upwards.  
Sodium Salicylate.—Powder, 2s. to 2s. 6d. per lb. Crystal, 2s. to 2s. 4d. per lb. Flake, 2s. 3d. per lb. Strong demand.  
Sodium Sulphide, pure recrystallised.—10d. to 1s. 2d. per lb.  
Sodium Sulphite, anhydrous, £27 10s. per ton, minimum 5 ton lots, according to quantity; 1-cwt. kegs included.  
Sulphonol.—12s. 8d. per lb.  
Thymol.—17s. per lb.

### Perfumery Chemicals

Acetophenone.—9s. per lb.  
Aubepine (ex Anethol).—10s. per lb.  
Amyl Acetate.—3s. per lb.  
Amyl Butyrate.—6s. 6d. per lb.  
Amyl Salicylate.—3s. 1½d. per lb.  
Anethol (M.P. 21/22° C.).—5s. per lb.  
Benzyl Acetate from Chlorine-free Benzyl Alcohol.—2s. 6d. per lb.  
Benzyl Alcohol free from Chlorine.—2s. 6d. per lb.  
Benzaldehyde free from Chlorine.—3s. per lb.  
Benzyl Benzoate.—3s. per lb.  
Cinnamic Aldehyde Natural.—15s. 6d. per lb.  
Coumarin.—14s. 6d. per lb.  
Citronellol.—20s. per lb.  
Citral.—8s. 6d. per lb.  
Ethyl Cinnamate.—9s. per lb.  
Ethyl Phthalate.—3s. per lb.  
Eugenol.—10s. per lb.  
Geraniol (Palmarosa).—28s. 6d. per lb.  
Geraniol.—9s. 6d. to 18s. 6d. per lb.  
Heliotropine.—6s. 3d. per lb.  
Iso Eugenol.—14s. 6d. per lb.  
Linalol ex Bois de Rose.—20s. per lb.  
Linalyl Acetate.—18s. 6d. per lb.  
Methyl Anthranilate.—10s. per lb.  
Methyl Benzoate.—5s. per lb.  
Musk Ambrette.—50s. per lb.  
Musk Ketone.—34s. 6d. per lb.  
Musk Xylol.—9s. 9d. per lb.  
Nerolin.—4s. 6d. per lb.  
Phenyl Ethyl Acetate.—15s. per lb.  
Phenyl Ethyl Alcohol.—13s. 6d. per lb.  
Rhodinol.—37s. 6d. per lb.  
Safrol.—1s. 8d. per lb.  
Terpineol.—1s. 10d. per lb.  
Vanillin.—25s. to 25s. 6d. per lb.

### Essential Oils

Almond Oil, Foreign S.P.A.—13s. 3d. per lb.  
Anise Oil.—3s. per lb.  
Bergamot Oil.—15s. 9d. per lb.  
Bourbon Geranium Oil.—18s. per lb.  
Camphor Oil.—60s. per cwt.  
Cananga Oil, Java.—11s. 3d. per lb.  
Cinnamon Oil, Leaf.—5½d. per oz.  
Cassia Oil, 80/85%.—9s. 3d. per lb.  
Citronella Oil.—Java, 85/90%, 4s. 6d. per lb. Ceylon, 2s. 10d. to 3s. per lb., according to quality.  
Clove Oil.—7s. 6d. per lb.  
Eucalyptus Oil, 70/75%.—2s. per lb.  
Lavender Oil.—French 38/40% Esters, 29s. 9d. per lb.  
Lemon Oil.—5s. 3d. per lb. Advanced again.  
Lemongrass Oil.—4s. 9d. per lb.  
Orange Oil, Sweet.—10s. 9d. per lb.  
Otto of Rose Oil.—Bulgarian, 45s. per oz. Anatolian, 26s. 6d. per oz.  
Palma Rosa Oil.—15s. 6d. per lb.  
Palma Rose Oil.—15s. 3d. per lb.  
Peppermint Oil.—Wayne County. No good quality material available. Japanese, 16s. 3d. per lb.  
Petitgrain Oil.—8s. 6d. per lb.  
Sandal Wood Oil.—Mysore, 26s. per lb. Australian, 18s. 6d. per lb.

## Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, July 10, 1925

BUSINESS in heavy chemicals continues fairly satisfactory, but buyers' tendency is to cover only for immediate requirements with consequent limitation in volume of orders placed.

Prices both for Home and Continental products show little change.

### Industrial Chemicals

ACID, ACETIC.—In moderate request and price unchanged. 98/100% Glacial, £56 to £67 per ton, according to quality and packing, c.i.f. U.K. ports. 80% pure, £40 to £42 per ton. 80% technical, £39 to £41 per ton, packed in casks, c.i.f. U.K. ports.

ACID, BORIC.—Crystal, granulated or small flaked, £40 per ton; powdered, £42 per ton, packed in bags, carriage paid U.K. stations, minimum ton lots.

ACID, CARBOLIC, ICE CRYSTALS.—Still in poor demand. Nominally 4½d. per lb., delivered, but this price could be shaded for larger quantities.

ACID, CITRIC, B.P. CRYSTALS.—In good demand and price unchanged at about 1s. 4½d. per lb., less 5% ex store. Offered for early delivery from the Continent at 1s. 4½d. per lb., less 5% ex wharf.

ACID, FORMIC 85%.—Now quoted £49 per ton, ex store. Offered for prompt shipment from the Continent at about £47 per ton, c.i.f. U.K. ports.

ACID, HYDROCHLORIC.—In little demand. Price 6s. 6d. per carboy, ex works.

ACID, NITRIC 80%.—Usual steady demand quoted £23 15s. per ton, ex station, full truck loads.

ACID, OXALIC 98/100%.—Spot material quoted 3½d. per lb., ex wharf, but could probably be obtained for less. Offered for prompt shipment at 3½d. per lb., ex wharf.

ACID, SULPHURIC.—144°, £3 12s. 6d. per ton; 168°, £7 per ton, ex works, full truck loads. Dearsenicated quality 20s. per ton more.

ACID, TARTARIC, B.P. CRYSTALS.—In moderate demand and price unchanged at about 1s. 1d. per lb., less 5% ex store. Offered for prompt shipment at 1s. 0½d. per lb., less 5% ex wharf.

ALUMINA, SULPHATE, 17/18% Iron Free.—Spot lots quoted £6 10s. per ton, ex store. Offered for prompt shipment from the Continent at about £6 5s. per ton, c.i.f. U.K. ports.

ALUM, LUMP POTASH.—Spot material quoted £9 7s. 6d. per ton, ex store. Offered for prompt shipment at about £8 5s. per ton, c.i.f. U.K. ports.

AMMONIA, ANHYDROUS.—Usual steady demand and price unchanged. About 1s. 4½d. per lb., ex station. Containers extra and returnable.

AMMONIA, CARBONATE.—Lump, £37 per ton; powdered, £39 per ton, packed in 5-cwt. casks, delivered U.K. ports.

AMMONIA, LIQUID 88%.—In steady demand. Unchanged at 2½d. to 3d. per lb. delivered, according to quantities.

AMMONIA, MURIATE.—Grey galvaniser's crystals quoted £28 per ton, ex station. Offered from the Continent at about £24 per ton, c.i.f. U.K. ports. Fine white crystals quoted £19 10s. per ton, c.i.f. U.K. ports.

ARSENIC.—Refined white Cornish arsenic at about £25 per ton, ex wharf, early delivery. Spot lots quoted £26 per ton, ex store. Foreign arsenic quoted £23 5s. per ton, c.i.f. U.K. ports.

BARIUM, CARBONATE 98/100%.—Offered from the Continent at £7 15s. per ton, c.i.f. U.K. ports, prompt shipment.

BARIUM, CHLORIDE 98/100%.—English material quoted £10 5s. per ton, ex store. Crystal offered from the Continent at £8 5s. per ton, c.i.f. U.K. ports.

BLEACHING POWDER.—Spot lots quoted £10 10s. per ton, ex station. Contracts 20s. per ton less.

BARYTES.—English material unchanged at £5 5s. per ton, ex works. Continental quoted £5 per ton, c.i.f. U.K. ports.

BORAX.—Granulated, £24 10s. per ton; crystals, £25 per ton; powdered, £26 per ton, carriage paid U.K. stations, minimum ton lots.

CALCIUM CHLORIDE.—English material unchanged at £5 12s. 6d. to £5 17s. 6d. per ton, carriage paid U.K. stations. Continental rather cheaper at about £3 12s. 6d. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—Unchanged at about £3 5s. per ton, ex works, packed in casks free.

COPPER, SULPHATE.—Unchanged at about £24 10s. per ton f.o.b. U.K. ports for export. Spot material available at £23 10s. per ton, ex store.

FORMALDEHYDE 40%.—Spot material now quoted £40 per ton, ex store. Offered for prompt shipment from the Continent at about £38 15s. per ton, c.i.f. U.K. ports.

GLAUBER SALTS.—English material quoted £4 per ton, ex store. Continental on offer at about £3 2s. 6d. per ton, c.i.f., U.K. ports.

LEAD, RED.—Imported material unchanged at about £42 to £42 10s. per ton, ex store. Offered from the Continent at about £39 10s. per ton, c.i.f. U.K. ports.

LEAD, WHITE.—Quoted £43 per ton, ex store, spot delivery.

LEAD ACETATE.—White crystals quoted £44 10s. per ton, spot delivery. Brown quality £43 per ton, ex store. White crystals on offer from the Continent at £43 15s. per ton, c.i.f. U.K. ports. Brown about £38 per ton, c.i.f. U.K. ports.

LEAD NITRATE.—In moderate demand. Quoted £42 per ton, ex station or f.o.b.

MAGNESITE, GROUND CALCINED.—Usual steady demand and prices unchanged at about £8 per ton, ex station.

MAGNESIUM, CHLORIDE.—Offered for prompt shipment at £5 per ton, c.i.f. U.K. ports. Some spot material still available at below this figure.

POTASH, CAUSTIC, 88/92%.—Unchanged at about £29 per ton, ex wharf, prompt shipment from the Continent. Spot material available at about £30 10s. per ton, ex store.

POTASSIUM BICHROMATE.—Price for home consumption 5d. per lb. delivered.

POTASSIUM CARBONATE, 96/98%.—Rather higher prices from the Continent. Quoted £25 10s. per ton, c.i.f. U.K. ports. Spot material available at about £26 5s. per ton, ex store.

POTASSIUM CHLORATE.—Still scarce for early delivery. Some available at about 3½d. per lb., c.i.f. U.K. ports. Spot material quoted 4d. per lb., ex store.

POTASSIUM NITRATE, SALTPETRE.—Refined granulated 99% quoted at about £28 per ton, ex store. Quoted £24 10s. per ton, c.i.f. U.K. ports for prompt shipment from the Continent.

POTASSIUM PERMANGANATE, B.P. CRYSTALS.—On offer at 7½d. per lb., ex store. Offered for prompt shipment from the Continent at about 7½d. per lb. ex wharf.

POTASSIUM PRUSSIAN, YELLOW.—In little demand; quoted 7d. to 7½d. per lb., ex store.

SODA, CAUSTIC, 76/77%.—£18 per ton; 70/72%, £16 12s. 6d. per ton. Broken, 60%, £17 2s. 6d. per ton. Powdered, 98/99%, £21 7s. 6d. per ton. All carriage paid U.K. stations, spot delivery. Contracts 20s. per ton less.

SODIUM ACETATE.—Spot material quoted £20 5s. per ton, ex store. On offer from the Continent at about £17 15s. per ton, c.i.f. U.K. ports.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station. M.W. quality, 30s. per ton less.

SODIUM CARBONATE.—Soda crystals, £5 to £5 5s. per ton, ex quay or station. Powdered or pea quality, £1 7s. 6d. per ton more.

Alkali 58%, £8 12s. 3d. per ton, ex quay or station.

SODIUM HYPOSULPHITE.—English material quoted £9 10s. per ton, ex station. Pea crystals, £14 per ton, ex station. Continental on offer at about £9 5s. per ton, ex store.

SODIUM NITRATE.—Quoted £13 per ton, ex store; 96/98% refined quality, 7s. 6d. per ton extra.

SODIUM NITRITE, 100%.—Quoted £24 per ton, ex store. Offered from the Continent at about £22 5s. per ton, c.i.f. U.K. ports.

SODIUM PRUSSIAN, YELLOW.—Unchanged at about 4d. per lb., ex store in moderate demand.

SODIUM SULPHATE, SALTCAKE.—Price for home consumption, £3 10s. per ton, f.o.b. works. Good inquiry for export and higher prices obtainable.

SODIUM SULPHIDE.—English material: Solid, 60/62%, now £13 per ton. Broken, £14 per ton. Flake, £15 per ton. Crystal, £8 10s. per ton, carriage paid U.K. stations, minimum 4 ton lots, with slight reductions for contracts to the end of the year; 60/62%, solid offered from the Continent at £10 15s. per ton, c.i.f. U.K. ports. Broken, £1 per ton more; 30/32% crystals, £7 15s. per ton, c.i.f. U.K. ports.

SULPHUR.—Flowers, £9 10s. per ton; roll, £8 10s. per ton; rock, £8 7s. 6d. per ton; ground, £8 5s. per ton—ex store, prices nominal.

ZINC CHLORIDE, 98/100%.—Quoted from the Continent at £24 5s. per ton, c.i.f. U.K. ports; 97/98% of English manufacture on offer at £25 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Commercial crystals on offer from the Continent at about £12 per ton, c.i.f. U.K. ports.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

**Coal Tar Intermediates and Wood Distillation Products**

BENZIDINE BASE.—Small home inquiries, 3s. 6d. per lb.

ALPHA NAPHTHOL.—Fair home inquiries, 2s. per lb.

BENZOIC ACID.—Fair home inquiries, 1s. 10d. to 1s. 11d. per lb.

DICHLOROBENZIDINE.—Fair export inquiries, 8s. per lb.

BENZALDEHYDE.—Some home inquiries, 2s. 2d. per lb.

## Manchester Chemical Market

[FROM OUR OWN CORRESPONDENT.]

Manchester, July 10, 1925.

WITH most of the large chemical-using industries on short time and producing on a basis much below their normal, the home demand for heavy chemicals on the Manchester market as yet shows little or no indication of improvement. On the other hand, the position is probably no worse than it has been for some time. Buying, for the most part, continues to be for spot or early delivery and transactions are chiefly in respect of comparatively small parcels. Export business is also slow.

### Heavy Chemicals

The demand for hyposulphite of soda has been rather better and prices are steady at £13 15s. per ton for photographic crystals and round £9 for commercial quality. Sulphide of sodium has been just a shade more active with values about unchanged from last report at £12 15s. to £13 per ton for 60-65 per cent. concentrated solid and £9 5s. per ton for crystals. Bleaching powder is in rather limited request at £9 10s. per ton. Saltcake is still in limited inquiry both for home use and for shipment, though quotations are steadier at £3 12s. 6d. per ton. Glauber salts are selling very slowly, and prices are easy at £3 10s. to £3 12s. 6d. per ton. Prussiate of soda is steady and in quiet demand at round 4d. per lb. Caustic soda continues to attract a fair amount of attention and values are well maintained at from £15 12s. 6d. per ton for 60 per cent. material to £18 for 76-77 per cent. Alkali also is in quietly steady demand, with prices firm at about £6 15s. per ton. Phosphate of soda is quiet but unchanged from recent levels at £12 10s. to £12 15s. per ton. Bicarbonate of soda is steady at £10 10s. per ton, though sales are rather restricted. Soda crystals are still quoted at £5 5s. per ton, and a fair amount of business is being done. Chlorate of soda is steady at 2½d. to 3d. per lb. Acetate of soda is slow and values have an easy tendency at about £19 per ton.

Values of caustic potash and carbonate of potash are steady, though in neither case is buying activity very pronounced. Caustic is on offer at £29 to £30 per ton and carbonate at round £25 10s. Permanganate of potash is quiet at 6d. to 6½d. per lb. for commercial quality and about 7½d. for pharmaceutical. Prussiate of potash is steady and in moderate request at 7d. per lb. Chlorate of potash is unchanged and in quiet demand at 3½d. per lb. Bichromate of potash is maintained at 5d. per lb., but business is rather restricted.

Arsenic keeps quiet, but there has been no further weakening, white powdered, Cornish makes, being offered at about £26 per ton in Manchester. Sulphate of copper is in limited request at £24 to £24 10s. per ton. Commercial Epsom salts are quiet but steady at £4 5s. to £4 10s. per ton, with magnesium sulphate, pharmaceutical quality, on offer at round £6. Acetate of lime is inactive at about £14 10s. per ton for grey and £8 10s. for brown. Acetate of lead is steady though in small demand at £44 to £45 per ton for white and £40 for brown. Nitrate of lead is still on offer at round £41 per ton.

### Acids and Tar Products

Oxalic acid is attracting only a limited amount of attention and values are on the easy side at 3½d. per lb. Citric acid meets with a fair enquiry at 1s. 4½d. to 1s. 4¾d. per lb. Tartaric acid is steady at 11¾d. to 1s. per lb. Acetic acid is steady and in moderate request at £38 to £39 per ton for 80 per cent. commercial and £67 for glacial.

In few of the coal-tar products is much business being done. Pitch meets with little actual demand and prices are nominal at something under £40 per ton. Carboic acid is still very quiet and weak at 4½d. per lb. for crystal and 1s. 6d. per gal. for crude. Naphthalene is about on the same level as last week, but sales are slow; refined is £13 to £13 10s. and crude from £4 per ton. Creosote oil is quoted at 6d. and solvent naphtha at 1s. 4½d. to 1s. 5d. per gallon.

## Bismuth Prices

May and Baker, Ltd., manufacturing chemists, of Battersea, London, advise us of an advance in the prices of bismuth salts, owing to the dearer market for bismuth metal.

The quantity prices are as follows and apply only for cash terms; smaller quantities would be charged extra:—

|                   |       | Under<br>1 cwt.<br>s. d. | Not less<br>than 1 cwt.<br>s. d. |
|-------------------|-------|--------------------------|----------------------------------|
| Bismuth Carbonate | .. .. | 13 3                     | 13 0 lb.                         |
| " Citrate         | .. .. | 11 10                    | 11 7 "                           |
| " Nitrate Cryst.  | .. .. | 7 2                      | 6 11 "                           |
| " Oxide           | .. .. | 14 8                     | 14 5 "                           |
| " Salicylate      | .. .. | 10 8                     | 10 5 "                           |
| " Subchloride     | .. .. | 12 11                    | 12 8 "                           |
| " Subgallate      | .. .. | 9 9                      | 9 6 "                            |
| " Subnitrate      | .. .. | 11 3                     | 11 0 "                           |

Quantities of two cwt. and upwards, for prompt delivery, or deliverable over three months, are subject to rebate of 3d. per lb., on completion—the various salts may be taken in assorted quantities, if so required.

|                                  |       | s. d.    |
|----------------------------------|-------|----------|
| Liquor Bismuth, P.B., in W. Qts. | .. .. | 1 2½ lb. |
| " " " 12 "                       | .. .. | 1 1½ "   |
| " " " 36 "                       | .. .. | 1 1 "    |

Without engagement: net cash in 14 days.

### "An Unsuccessful Oil Venture"

J. F. CROWLEY AND PARTNERS, of 11, Queen Anne's Gate, Westminster, London, S.W.1, have written us in connection with a paragraph under the above heading in our issue of June 27.

"According to your account," the letter states, "a report was read which had been presented to the last meeting of The New Motor Spirit Company, Ltd., and in which certain statements were made relating to the late Dr. J. A. Harker, F.R.S., who was a partner in this firm, and to his alleged relations with the Company. In actual fact neither the late Dr. Harker individually nor this firm collectively were ever officially consulted by The New Motor Spirit Company. On Friday, October 5, 1923, Dr. Harker received a letter informing him that at a Board meeting held on that day it was resolved that either Dr. Harker or this firm should be appointed consultants to the company and suggesting a meeting for discussion. On October 10, and before the suggested meeting took place, Dr. Harker died. Nothing further was arranged, and neither Dr. Harker nor ourselves have at any time received any fees from the company or from anyone connected with it.

"As to the reference to Dr. Harker's suggestion regarding the risk in handling the material, we give the following extract from our office records:—'Towards the end of August, 1923, he (Sir Henry Gould-Adams) took Dr. Harker out to the inventor's home and in a small laboratory attached to the house some demonstrations of the working of the apparatus were given. Incidentally, when the inventor was pouring some of the light spirit from a can into a vessel in order to measure the density the whole suddenly caught fire, but fortunately, it was extinguished without any very serious damage. Dr. Harker thereupon told Sir Henry that nothing further ought to be done until the cause of this ignition was thoroughly investigated.'

"This was the only association of Dr. Harker with the experiments in question, with the exception of a visit he paid to the laboratory on October 3, 1923, when a further demonstration was given."

### Greeff-Dyestuffs (Manchester), Ltd.

MR. F. G. WILLIAMS, in a circular issued from Trinity House, 110, Chapel Street, Salford, announces the transfer of his business in dyestuffs, etc., to Greeff-Dyestuffs (Manchester), Ltd., a new company formed to undertake as agents for R. W. Greeff and Co., Ltd., of London, the sale of the dyestuffs formerly sold by them through their Manchester office. Mr. Williams has joined the board of the new company and his two sons, Mr. Arthur F. Williams and Mr. G. Herbert Williams, will be associated with the management. He will discharge all liabilities and receive all payments accruing up to April 30, and the new company will do the same from May 1.

## Company News

**JOHN KNIGHT.**—A dividend has been declared on the 25 per cent. cumulative preferred ordinary shares, payable on July 31, at the rate of 12½ per cent. for the half-year to May 31 last.

**TARAPACA AND TOCOPILLA NITRATE CO., LTD.**—Particulars were published on Wednesday, for public information only, of an issue of £400,000 6½ per cent. debentures in registered debentures of £100 each.

**TARMAC, LTD.**—The directors have declared an interim dividend in respect of the year 1925 upon the issued ordinary share capital of the company at the rate of 6d. per share, free of income tax, payable on August 1 next.

**LEVER ZEEF MAATSCHAPPIJ.**—It is announced that this Dutch subsidiary company of Lever Brothers is issuing 20,000,000 guilders 5½ per cent. bonds to convert the 7 per cent. loan of 1920 maturing on October 15. The issue price is 97.

**MINERALS SEPARATION, LTD.**—For the year 1924 the profit and loss account shows a credit balance amounting to £6,826. A debit of £2,682 was brought in, reducing credit to £4,144. The annual meeting will be held at Winchester House, London, on July 15.

**ELECTROLYTIC ZINC CO. OF AUSTRALASIA, LTD.**—The directors have declared a dividend at the rate of 12 per cent. per annum for the six months ended June 30 last on the whole of the issued preference, ordinary and deferred ordinary shares, payable September 3 to shareholders registered on July 24, 1925.

**BRITISH OIL AND CAKE MILLS, LTD.**—An extraordinary general meeting was held at Winchester House, London, on Wednesday, for the purpose of confirming the arrangements with Lever Brothers, Ltd. The resolutions passed at the extraordinary general meeting held on June 22 last were unanimously confirmed as special resolutions.

**VAN DEN BERGHS, LTD.**—The net profit for the year 1924 totalled £221,681, and a balance of £114,624 was brought in making a total of £336,305. After payment of the preference and preferred ordinary dividends a balance of £64,588 remains, which it is proposed to carry forward. The directors do not recommend the payment of a dividend on the ordinary shares.

**BRITISH OXYGEN CO., LTD.**—The net profit for the year ended March 31 amounted to £137,090 (against £150,278 in 1923-24). A final dividend of 1s. 6d. per share is proposed, making 10 per cent., less tax, for the year. After deducting £5,000 for stamp duty on increased capital, the balance of £57,090 is added to the amount brought in, making a total of £219,269 to be carried forward (against £202,179). This amount is subject to contingencies, any outstanding E.P.D., the balance of corporation tax, and income tax for 1924-25.

**ALLEN LIVERSIDGE, LTD.**—The accounts for the year ended April 30 last show that after charging repairs, maintenance, depreciation, interest on debenture stock, and other expenses, the net profit amounted to £46,816. A sum of £5,000 is allocated to general reserve, and £5,000 to reserve against patents, development, and goodwill account. The directors recommend a final dividend of 7½ per cent. on the ordinary shares, making 12½ per cent. for the year, leaving £5,173 to be carried forward, against £4,954 brought forward from last year. In the previous report, which was for a period of six months, the profit amounted to £25,077, and the dividend on the ordinary shares was at a similar rate.

## Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

**HEAVY CHEMICALS, DISINFECTANTS.**—A gentleman, having had twelve years' experience with one of the leading chemical manufacturers and agents in India, is at present in the United Kingdom with a view to securing the representation of British firms interested in the above lines. It is his intention to act as a manufacturers' agent and to open out on his own account in Calcutta. (Reference No. 3.)

**FERTILISERS.**—Greek commission agents in Athens wish to represent British exporters of fertilisers and fish glue. (Reference No. 45.)

**VEGETABLE OILS.**—A broker in Philadelphia desires to represent British manufacturers or exporters of vegetable oils. He would be prepared to act on a strictly commission basis. (Reference No. 64.)

**LUBRICATING OILS.**—The Roumanian State Railways invite tenders, to be presented by July 25 for the supply and delivery of 500,000 kilos. of lubricating oil for steam locomotives. Further particulars upon application. (Reference No. B.X. 1909.)

**INDUSTRIAL CHEMICALS.**—An agent established at Oporto is desirous of obtaining the representation of British manufacturers of industrial chemicals and drugs. (Reference No. 56.)

**SALT CAKE, ALUMINO-FERRIC, SULPHUR.**—A firm of commission agents in Oslo desire to represent British manufacturers of salt cake, for the cellulose industry, aluminoferric for the paper-making industry and also exporters of sulphur. (Reference No. 54.)

## New Chemical Trade Marks

### Applications for Registration

This list has been specially compiled for us by Mr. H. T. P. Gee, Patent and Trade Mark Agent, Staple House, 51 and 52, Chancery Lane, London, W.C.2, from whom further information may be obtained, and to whom we have arranged to refer any inquiries relating to patents, trade marks and designs.

Opposition to the Registration of the following Trade Marks can be lodged up to August 1, 1925.



458,717. Class 4. Raw or partly prepared vegetable, mineral, and animal substances used in manufactures, not included in other classes, but not including cutch or bristles, and not including any goods of a like kind to any of these excluded goods. British Cyanides Co., Ltd., 49, Queen Victoria Street, London, E.C.4, manufacturers. May 7, 1925.



447,770. Class 4. Essential oils. A. Boake, Roberts and Co., Ltd., 100, Carpenter's Road, Stratford, London, E.15, manufacturing chemists. (To be Associated. Sect. 24.) April 25, 1924.

Opposition to the registration of the following trade marks can be lodged up to August 8, 1925.

### "GENOXIDE"

458,149. For chemical substances used in manufacture, photography or philosophical research, and anti-corrosives. B. Laporte, Ltd., Kingsway, Luton, Bedfordshire; chemical manufacturers. April 17, 1925. (To be Associated, Section 24.)

458,150. For chemical substances used for agricultural, horticultural, veterinary and sanitary purposes. B. Laporte, Ltd., Kingsway, Luton, Bedfordshire; chemical manufacturers. April 17, 1925. (To be Associated, Section 24.)

## Tariff Changes

**GENERAL.**—The Board of Trade Journal for July 2 contains a useful summary of all the principal tariff changes in every country during the first six months of this year.

**UNITED KINGDOM.**—The Customs and Excise duties on silk and artificial silk, sugar, glucose, etc., are recorded. (See THE CHEMICAL AGE, May 2 and 30, 1925.)

**SOUTHERN RHODESIA.**—A tariff revision is proposed and the text of the suggested schedules may be seen at the D.O.T.

**ITALY.**—Machines for prospecting for, and extraction of, petroleum may be imported duty-free on application.

**PORTUGAL.**—The following alterations are enforced as from July 24:—

| Articles.   | Rate of duty under the Minimum Tariff. |            |
|---|--|------------|
|   | Former.                                | New.       |
|   | Esc. cts.                              | Esc. cts.  |
|   | per kilog.                             | per kilog. |
| Lime, hydraulic lime and cement ..                                | 0 00.4                                 | 0 00.5     |
| Maltose, lactose and levulose ..                                  | ..                                     | 0 03       |
| Sugar:  |  |            |
| Powdered by the Portuguese system, above No. 20 Dutch standard .. | 0 01.8                                 | 0 03       |
| Not specially mentioned ..  | 0 01.5                                 | 0 02       |
| Glucose, in any state ..  | 0 01.8                                 | 0 03       |

## Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

### County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

BOOTH, T. A., Tee A Bee Works, Idle, druggist. (C.C., 11/7/25.) £16 6s. 3d. June 5.

HODSON AND YATES, Ouse Bridge Works, Carlton, fertilising manufacturers. (C.C., 11/7/25.) £11 3s. 4d. May 29.

KENNEDY, A. AND SON, 159, Kingsland Road, E., druggists' sundriesmen. (C.C., 11/7/25.) £54 10s. May 22.

LAMBERT (SAMUEL) AND CO., LTD., 10, Great St. Helens, E.C., drug merchants. (C.C., 11/7/25.) £21 16s. 3d. March 6.

### Mortgages and Charges

[NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.]

HARDING CHEMICAL CO., LTD., Manchester. (M.; 11/7/25.) Registered June 23, £300 debentures, part of £2,000, general charge. \*£1,300. December 31, 1924.

HEMINGWAY AND CO., LTD. (late HEMINGWAY'S CHEMICAL PROCESSES CO., LTD.), London, E. (M., 11/7/25.) Registered June 26, £12,500 debentures; charged on property at West Ham, also general charge. \*—, December 29, 1924.

MEXCO, LTD., London, S.W., chemists. (M., 11/7/25.) Registered June 24, £10,000 debentures (filed under section 93 (3) of the Companies (Consolidation) Act 1908), present issue £5,000; general charge.

TEUCER, LTD., Southend-on-Sea, chemists. (M., 11/7/25.) Registered June 23, £10,000 (not ex.) charge, to bank; charged on 167, High Street and premises at rear and 52, Alexandra Street, Southend-on-Sea. \*—, June 11, 1924.

## London Gazette, &c.

### Companies Winding Up Voluntarily

BUCHANAN, CHEMISTS, LTD. (C.W.U.V., 11/7/25.) By special resolution, June 18, confirmed July 3, Miss A. T. Borrowman, 17, The Pavement, Clapham, S.W., director of this company, appointed liquidator.

GILCOUR OIL AND DRUG CO., LTD. (C.W.U.V., 11/7/25.) G. H. Walker, 37, Southgate, Halifax, incorporated accountant, appointed liquidator, June 27. Meeting of creditors at Imperial Chambers, George Square, Halifax, on Wednesday, July 15, at 2.15 p.m.

### Bankruptcy Information

LEADWOOD, Harold, 120, Lord Street, Great Grimsby, embrocation manufacturer. (R.O., 11/7/25.) Receiving order, June 27. Debtor's petition. \*First meeting July 11, 11 a.m., Official Receiver's office, St. Mary's Chambers, Great Grimsby. Public examination, August 6, 11 a.m., Town Hall, Great Grimsby.

## New Companies Registered

BLUECASTLE, LTD., Leith Chambers, Quayside, Newcastle-on-Tyne. Buyers, sellers, importers, exporters and manufacturers of and dealers in blue, starch, ultramarine, washing powder and pigments, soaps, oils, etc. Nominal capital, £500 in £1 shares.

COOPER, McDUGALL AND ROBERTSON (SCOTLAND), LTD., 47, Russell Square, London, W.C.1. Manufacturing, agricultural and general chemists, manufacturers of and dealers in sheep dips, drugs, disinfectants, fertilisers, chemical manures, etc. Nominal capital, £10,000 in £1 shares.

ORGANIC FERTILISERS (FOREIGN PATENTS), LTD., 729-730, Salisbury House, London Wall, London. To acquire and deal with patents relating to the treatment of sewage sludge. Nominal capital, £100 in 1s. shares.

SHELLAC BLEACHERS, LTD. Shellac bleaching and refining merchants. Nominal capital, £1,100 in £1 shares. Solicitors: Morgan, Scott and Scott, Cardiff.

## Chilean Nitrate Prospects

SPEAKING at the annual general meeting of the Rosario Nitrate Co., Ltd., in London on Wednesday, Lord Cullen said that looking back over the events of 1924-25, there was cause for some satisfaction in regard to Chilean nitrate. Consumption in the year to June 30, 1925, was round about 2,350,000 tons, against 2,190,000 tons in the previous year, and, in so far as sales to exporters are any guide as to probable consumption, they had commenced the new season in encouraging fashion, association sales having been made for 10,590,493 metric quintals, of which 3,000,000 are for June delivery. On the other hand, the abnormal political situation in Chile had had some disturbing influences. Labour troubles, as was to be expected at such a time, had been acute and somewhat frequent, and a mass of rather hasty legislation had been passed, the ultimate effects of which it will not be possible to estimate until the corresponding regulations have been framed and applied, though the immediate result had been a good deal of expense and worry to the producers of Chilean nitrate.

The sale prices fixed by the association for the year 1925-26 average about 20s. 2d. per metric quintal, which was practically the same as that for the year 1924-25. For the new nitrate year, however, the association had granted a fall clause protecting buyers in the event of sale prices being reduced later in the season as a consequence of any reduction in the export duty by the Chilean Government. In addition, an allowance was to be made in respect of any difference in price over that finally fixed for June, 1926, delivery on stocks unsold in buyers' hands at June 30 next in the port of destination, whether on shore or on board. This latter concession would not, however, make much difference to the average price obtained by producers, and it seemed doubtful if the fall clause would come into operation. If it does not, and consumption kept up, the present should be quite a satisfactory year.

## America's Coming Chemists

A NATIONAL census just completed shows that there are 1,763 students pursuing graduate research in chemistry in the universities and colleges of the U.S.A., according to a recent announcement by Dr. James F. Norris, president of the American Chemical Society.

New York institutions lead with 214 students, Illinois is second with 203 and Massachusetts third with 180.

The total number of research students is a gain over last year of 63, said Dr. Norris. The census indicates rapid advance in colloid chemistry, plans for a national institute of which are being made, and in fundamental research in petroleum. The physico-chemical group has more students than any other, its total being 544. Organic chemistry comes next with 430. Industrial and engineering chemistry is fourth with 184, and inorganic chemistry fifth with 86.

